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THE
NATIONAL
ENCYCLOPEDIA

FOR THE

HOME, SCHOOL AND LIBRARY

VOL. VII.

CHICAGO
NATIONAL ENCYCLOPEDIA COMPANY
1923

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MADE IN U. S. A.

NOV 19 1923
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are not known. He was born probably about 400 B. C. He was one of the greatest sculptors of ancient times. His life fell in the period succeeding that of Phidias, the great master of the sculptor's art. Phidias worked for the public; Praxiteles worked for private employers. His figures, groups, and statues were made chiefly for the adornment of palaces and private grounds. A number of his masterpieces are known through copies which have escaped destruction. Only one original is known certainly to have been preserved. It is a statue of Hermes bearing the infant Dionysius on his arm. It was discovered by German excavators in the ruins of Olympia. It is still preserved in a museum there. The face of the god is considered the most beautiful Greek face known to art. The Capitolian Museum at Rome possesses a satyr leaning gracefully on a support. It is almost certainly a faithful reproduction of one of the artist's greatest works. It furnished the subject for the title of Hawthorne's *Marble Faun*. Other reproductions are preserved in the Louvre, at Florence, Berlin, and elsewhere.

Preble, prĕb'l, **Edward** (1761-1807), an American naval officer. He ran away from home when he was seventeen, and when he returned he became midshipman on the Protector and assisted in the successful attack on the British privateer, Admiral Duff. He won further distinction during the Revolution, and when the navy was organized in 1798 he was made lieutenant, being promoted to captain the following year. During the war with the Barbary States he was assigned command of the Constitution, and in October, 1803, he arrived at Tangiers, where one of his ships, the Philadelphia, was captured. He bombarded the port of Tripoli in July, 1804, but in September of the same year he was relieved of his charge by the arrival of his senior officer, Captain Barron. In 1805 the treaty of peace was signed and as a recognition of his services, Congress gave him a gold medal and a vote of thanks. His nephew, George Henry Preble, also won distinction in naval affairs. He participated in both the Mexican and the Civil War, and received rank as rear-admiral in 1876.

Precedence, in social matters, priority of place. While precedence is a matter of small concern in ordinary society, and rightly so, it is a question of no little moment at state functions. In Washington society the order established by custom is the president, vice-president, president of the senate, foreign ambassadors, chief justice of the supreme court, United States senators, speaker of the House, representatives, associate justices, secretary of state, members of the various diplomatic corps, secretary of the treasury, secretary of war, attorney-general, postmaster-general, the secretaries of the navy, interior, agriculture, commerce and labor, general staff of the army, admirals, governors of states, etc. Women accompany their husbands or fathers.

The affair is still more complicated at the British court. Sixty-three ranks are recognized, beginning with the sovereign and ending with gentlemen. Next to the sovereign comes the Prince of Wales, the heir to the throne; then the younger sons of the sovereign, followed by grandsons, brothers of the sovereign, uncles of the sovereign, and nephews of the sovereign. If the sovereign be a woman, her husband, that is to say, the prince consort, has no place except as she may see fit to assign him. He cannot claim precedence in his own right over the nobility. The Archbishop of Canterbury comes next to the sovereign's own family. Then come various dignitaries of church and state, followed by dukes, marquises, earls, viscounts, and bishops. The speaker of the House belongs to the thirtieth rank; the chancellor of the exchequer to the forty-second; the lord chief justice to the forty-fourth. The dukes of England precede those of Scotland; those of Scotland precede the dukes of Ireland; all three precede dukes of the United Kingdom. Elder sons and younger sons are sandwiched in according to a fixed rule. A duke's eldest son ranks next below a marquis. A duke's younger sons rank below a marquis' eldest son, etc. Women follow the rank of their husbands or fathers. If a woman marry a man of low degree, she is entitled to attend her father, if she so prefer; but she cannot take her husband with her into her father's rank. A widow retains the rank of her husband. If she

marry again, however, she may choose between the rank of her father and her present husband. She may not retain that of her deceased husband. The king's wife has precedence over the king's mother. The adjustment of various social claims is a delicate matter. In England it pertains to the so-called College of Arms.

Prentiss, Sergeant Smith (1808-1850), an American lawyer and orator. He was born in Portland, Maine, and was graduated from Bowdoin College, Brunswick, Maine, in 1826. Three years later he was admitted to the bar at Natchez, Mississippi. He secured a large practice in Vicksburg and in 1835 was elected to the Mississippi legislature. In 1837 he was elected to Congress. When he reached Washington he found his seat occupied by Colonel Claiborne, the Democratic candidate. The contest over his seat became known as the "Mississippi Election Case," and Prentiss argued without success. The deciding vote was cast against him, but he was elected with a large majority at the next election. He supported General Harrison in 1840. In 1845 he opposed repudiation. He returned to his law practice and settled in New Orleans, gradually withdrawing from public life. He won and sustained a reputation as a brilliant and effective speaker.

Presbyterians, the members of various denominations holding a more or less modified form of the views of John Calvin. The principal denominations are the Established Church of Scotland, the Free Church of Scotland, the Reformed Church of the Netherlands and Germany, the Welsh Presbyterian Church, and the various Presbyterian churches of the United States and Canada. In matters of theology the Presbyterians are closely related to the Congregationalists. In matters of church government the Presbyterian polity is midway between that of the Congregationalists on one hand and the Episcopalians and Roman Catholics on the other. Local affairs are everywhere governed by the session, consisting of all the members of the church. The session elects elders and chooses ministers. The churches in a given locality are governed in turn by a presbytery consisting of all the ministers and an elder from each church. The presbyteries are in turn ruled by a synod. This, in the United States, corresponds in boundary usually with a state. The synod is composed of representatives from the various presbyteries, according to membership. The minimum representation is a minister and an elder for each presbytery. Representatives from the various synods constitute a general assembly, or court of last appeal. A member dissatisfied with the decision of a session may appeal to the presbytery, the synod, and the general assembly in turn. In all these matters, the members are on an equality. Deliberations are presided over by an officer chosen for the occasion. The system of government is strictly republican. A majority vote rules.

The first Presbyterian church in America was a Reformed Church established by the Dutch of New Amsterdam in 1628. The Puritans rather suppressed Presbyterianism in New England. The Virginians stood for Episcopacy. Pennsylvania, New Jersey, Delaware, Maryland, and the colonies of the South were more favorable to Presbyterianism. Philadelphia became the recognized center of the denomination.

Recent statistics show that there are throughout the world 41,500,000 members of this denomination. The largest branches are the Presbyterian Church in the United States of America, which had in 1921, 1,722,361 members; the Presbyterian Church in the United States, 397,058 members; the Reformed Church in the United States, 331,337 members; the United Presbyterian Church of North America, 212,621 members, and the Reformed (Dutch) Church in America, 135,674 members.

In Canada, the Presbyterian Church had 350,674 members in 1921; the Church of Scotland in Canada, 10,000; and Adherents, 700,000.

The Presbyterian Church conducts many important activities, such as foreign missions, Sabbath observance and home missions, evangelism, men's work, etc. There are 2,519,090 Sunday Schools in the United States within this denomination, and 286,889 in Canada.

Prescott, William (1726-1795), an American soldier, was born at Groton, Mass. He served as lieutenant and cap-

tain under General Winslow in 1755. After the Battle of Lexington he organized a regiment of minute men, and as its colonel, marched to Cambridge. Ordered to Charlestown in June of the same year, he threw up intrenchments at Breed's Hill, near Bunker Hill. On the following day a battle took place, in which he was the patriot commander; he distinguished himself for bravery and was the last to leave the battlefield. He served two years more, after which he returned to his farm, which he again left to serve as volunteer at Saratoga in 1777. Prescott was a member of the Massachusetts legislature for several years. In *Colonel William Prescott and Groton Soldiers in the Battle of Bunker Hill,* written by S. A. Green, a vivid story of those days is told.

Prescott, William Hickling (1796-1859), an eminent historian. In a dining room frolic he was struck upon the eyeball by a crust of bread and became almost blind. Revolving the matter in his mind he resolved to become a historian, and chose for his field the conquests of Spain in the New World. He was obliged to depend upon others to search the archives of Spain, but, by inventing a sort of frame to be moved down the page, he was able finally to do his own writing. Fortunately the material stored away by Spanish priests, soldiers, and travelers was abundant and not difficult of access. While collecting for his *Alhambra,* Irving amassed a vast quantity of material which he generously turned over to Prescott. All such material was read to him by his secretary. During the twenty years between 1837 and 1857 he produced a series of brilliant histories known as *Ferdinand and Isabella,* the *Conquest of Mexico, Conquest of Peru,* and *Reign of Philip II.* His volumes on Mexico and Peru are very pleasant reading, but are wholly out of date as history. In describing the civilization of Mexico and Peru and in narrating the actions of Cortez and Pizarro, Prescott saw what he wrote as though it were passing before his eyes, and he makes us see it, but his data were erroneous or wrongly understood. Being, as has been said, almost blind, he sat with his eyes closed and pictured to himself the events he desired to describe.

Preserves, prē-zẽrvz′, fruit cooked in sugar or sirup. Fruit spoils by reason of a fungus plant mold, or by reason of fermentation caused by another plant called yeast, or by reason of bacteria. Bacteria cannot live in excessive sweetness; molds and yeasts have little vitality in strong sirups. Fruits cooked in sirup are protected against decay just as pickles are protected by brine and laboratory specimens by alcohol. The general term preserves includes jelly, jam, marmalade, conserve, candied fruits, and so-called fruit butters. When the housewife uses the word preserves, however, she means fruits, or rarely vegetables, preserved without crushing, so that each cube or slice of the larger fruits, each berry, or cherry, or plum, floats unbroken in its rich liquid.

In jelly the only part of the fruit preserved is the clear juice. Some fruits, like peaches, do not contain sufficient vegetable jelly or pectin as it is called properly, so that the juice will "jell." Other fruits, as currants, plums, quinces, and certain kinds of grapes and apples, contain so much pectin that jellies may be made of them very easily either with or without sugar. In making jam the fruit, usually berries, is crushed and cooked with sugar until thick. For marmalade and butter both pulp and juice are used as in jam, but are put through a sieve or colander so that the resulting preserve is a perfectly smooth substance meriting the name butter. The word conserve may mean simply a confection, but is applied commonly to a mixture of highly flavored fruits, such as currants, oranges, and raisins, often with nuts added, cooked with sugar until very thick and eaten as a sweetmeat or confection. Candied fruits are fruits dried slowly with sufficient sugar to absorb the juices. Preserving is not only a universal household art among civilized people, but it has acquired large commercial proportions.

President, in governmental matters the highest officer of the state in a modern republic. The president of the French Republic is elected for seven years by the National Assembly. The president of the United States is chosen once in four years by a college of presidential electors. These electors are elected by the voters of the re-

spective states in November of each leap year. Though charged with the legal duty of electing the president, they vote invariably for candidates named in a nominating convention held prior to the presidential campaign.

The president of the United States is commander-in-chief of the army and of the navy and of the militia of the several states when in the service of the nation. He has power to grant reprieves and pardons for offenses against the laws of the United States. With the consent of two-thirds of the Senate, the president makes treaties and appoints cabinet officers, heads of bureaus, foreign ministers, consular agents, federal judges, territorial officials, postmasters, and the principal officers of the navy and the army. He may be impeached by the House of Representatives and be removed from office by a two-thirds vote of the Senate. His salary is $75,000 a year, and $25,000, traveling expenses. He is provided with an official residence at Washington, known as the White House. A large appropriation is made annually for the maintenance of the residence and other necessary outlay.

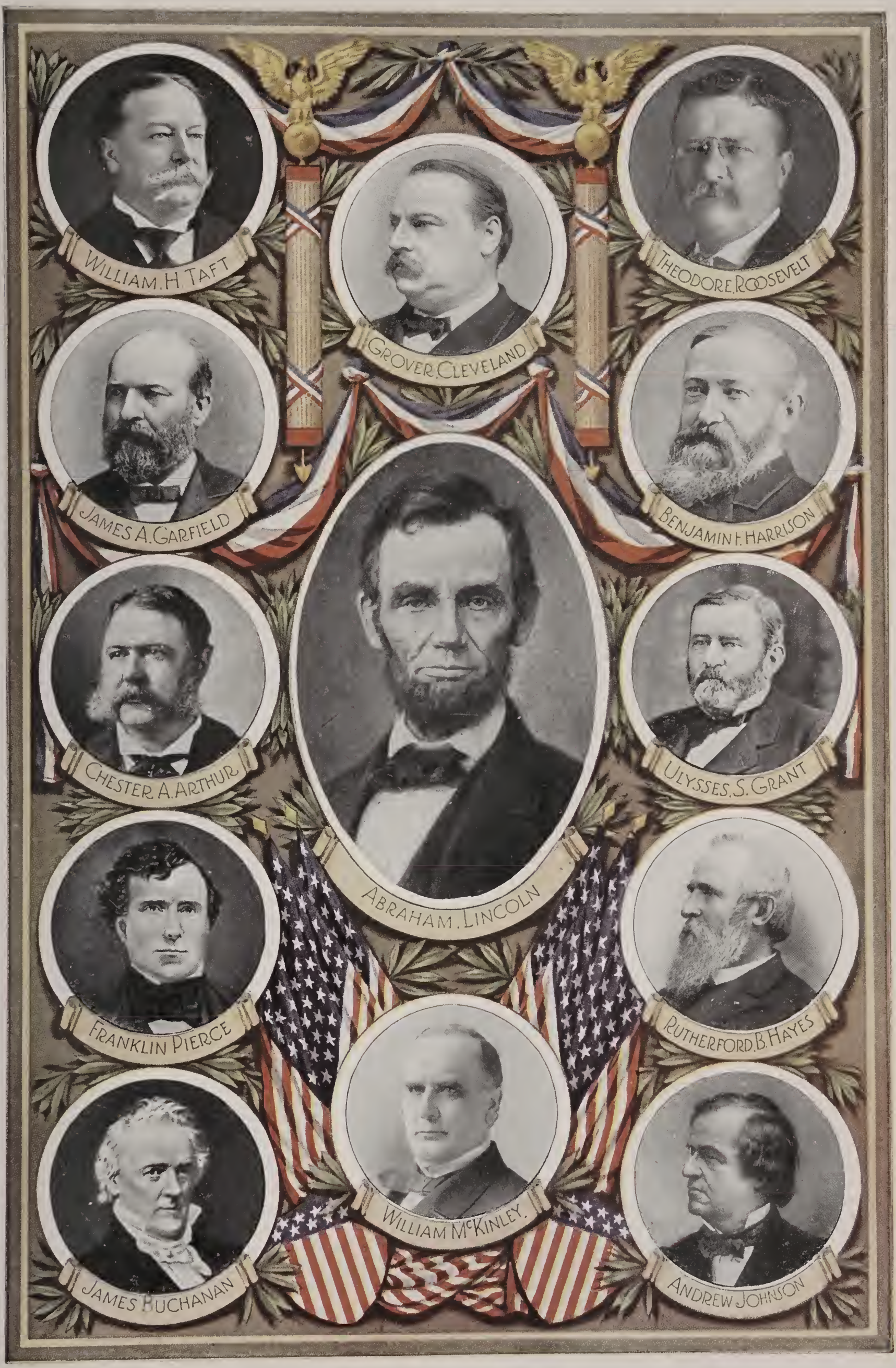
Twenty-nine different persons have been presidents of the United States. George Washington was the first president. William Henry Harrison was the oldest; Theodore Roosevelt, the youngest. William Henry Harrison, Zachary Taylor, Abraham Lincoln, James A. Garfield, and William McKinley died in office. As vice-presidents, Tyler, Fillmore, Johnson, and Arthur succeeded Presidents Harrison, Taylor, Lincoln, and Garfield, respectively, and were not reëlected to the office. Vice-President Roosevelt succeeded President McKinley and was subsequently elected for four years. Presidents Washington, Jefferson, Madison, Monroe, Jackson, Grant, Cleveland and Wilson served two terms each. The two terms of President Cleveland were separated by an interval of four years. Roosevelt is considered usually as having served two terms. Lincoln and McKinley were reëlected, but died before they had completed their second terms. Washington set the example of declining to run for a third term. This precedent has all the force of an unwritten law. John Quincy Adams was the son of President John Adams, and Benjamin Harrison the grandson of President W. H. Harrison. With the exception of Theodore Roosevelt and Martin Van Buren who are of Dutch descent, the paternal ancestry of all the presidents may be traced to the British Isles, being either English, Welsh, Scotch, or Irish.

The office of president, like any other position, is largely what the holder makes it. It is probable that George Washington, the first president, looked upon the office as one rather of dignity than of activity. He is credited with having maintained a carriage and having upheld social usages savoring of European royalty and with having refrained from direct attempts to shape legislation and guide the movements of the nation. Thomas Jefferson, on the contrary, is said to have ridden into Washington unconcernedly on horseback and to have hitched his horse to a post like any other plain American citizen. He was full of plans such as the Lewis and Clark Expedition, the Louisiana Purchase, and other measures for the national welfare.

Among the presidents who have been distinguished for force of character are Jefferson, Jackson, Lincoln, Cleveland, and Roosevelt. The last named in particular threw himself energetically into all departments of the government. He cannot be said to have pleased the older officials, but what the chiefs of the various departments were inclined to term presidential interference, the public, having little admiration for mossback methods and red tape, regarded rather as administrative efficiency. There is a recent tendency to look to the president to insist on congressional activity.

The presidential succession is fixed by chapter four of the acts of the forty-ninth Congress, first session. In case of the removal, death, resignation, or inability of both the president and vice-president, then the secretary of state shall act as president until the disability of the president or vice-president is removed or a president is elected. If there be no secretary of state, then the secretary of the treasury will act; and the remainder of the order of succession is as follows: The secretary of war, attorney-general, postmaster-general, secretary of the navy, and secretary of the in-

PRESIDENTS OF THE UNITED STATES



PRESIDENTS OF THE UNITED STATES

PRESIDENTS OF THE UNITED STATES.

	Name.	Birthplace.	Year.	Paternal Ancestry.	Residence.	Inaugurated. Year.	Inaugurated. Age.	Politics	Place of Death.	Year.	Age.
1	George Washington.....	Westmoreland Co., Va.....	1732	English	Va.	1789	57	Fed.....	Mt. Vernon, Va.....	1799	67
2	John Adams.....	Quincy, Mass.	1735	English	Mass.	1797	62	Fed.....	Quincy, Mass.	1826	90
3	Thomas Jefferson.....	Shadwell, Va.	1743	Welsh	Va.	1801	58	Rep.....	Monticello, Va.	1826	83
4	James Madison.....	Port Conway, Va.....	1751	English	Va.	1809	58	Rep.....	Montpelier, Va.	1836	85
5	James Monroe.....	Westmoreland Co., Va.....	1758	Scotch	Va.	1817	59	Rep.....	New York City.....	1831	73
6	John Quincy Adams.....	Quincy, Mass.	1767	English	Mass.	1825	58	Rep.....	Washington, D. C....	1848	80
7	Andrew Jackson.....	Union Co., N. C.....	1767	Scotch-Irish ..	Tenn.	1829	62	Dem.....	Hermitage, Tenn. ...	1845	78
8	Martin Van Buren.....	Kinderhook, N. Y.....	1782	Dutch	N. Y.	1837	55	Dem.....	Lindenwold, N. Y....	1862	79
9	William H. Harrison....	Berkeley, Va.	1773	English	O.	1841	68	Whig....	Washington, D. C....	1841	68
10	John Tyler	Greenway, Va.	1790	English	Va.	1841	51	Dem.....	Richmond, Va.	1862	72
11	James K. Polk.....	Mecklenburg Co., N. C.....	1795	Scotch-Irish ..	Tenn.	1845	50	Dem.....	Nashville, Tenn.	1849	53
12	Zachary Taylor	Orange Co., Va.....	1784	English	La.	1849	65	Whig....	Washington, D. C....	1850	65
13	Millard Fillmore.....	Summerhill, N. Y.....	1800	English	N. Y.	1850	50	Whig....	Buffalo, N. Y.....	1874	74
14	Franklin Pierce.....	Hillsboro, N. H.....	1804	English	N. H.	1853	49	Dem.....	Concord, N. H.....	1869	64
15	James Buchanan.....	Cove Gap, Pa.....	1791	Scotch-Irish ..	Pa.	1857	66	Dem.....	Wheatland, Pa.	1868	77
16	Abraham Lincoln.....	Larue Co., Ky.....	1809	English	Ill.	1861	52	Rep.....	Washington, D. C....	1865	56
17	Andrew Johnson.....	Raleigh, N. C.....	1808	English	Tenn.	1865	57	Rep.....	Carter's Depot, Tenn.	1875	66
18	Ulysses S. Grant.....	Point Pleasant, O.....	1822	Scotch	D. C.	1869	47	Rep.....	Mt. McGregor, N. Y.	1885	63
19	Rutherford B. Hayes....	Delaware, O.	1822	Scotch	O.	1877	54	Rep.....	Fremont, O.	1893	70
20	James A. Garfield.....	Cuyahoga Co., O.....	1831	English	O.	1881	49	Rep.....	Long Branch, N. J...	1881	49
21	Chester A. Arthur.....	Fairfield, Vt.	1830	Scotch-Irish ..	N. Y.	1881	51	Rep.....	New York City.....	1886	56
22	Grover Cleveland.....	Caldwell, N. J.....	1837	English	N. Y.	1885	48	Dem.....	Princeton, N. J.....	1908	71
23	Benjamin Harrison.....	North Bend, O.....	1833	English	Ind.	1889	55	Rep.....	Indianapolis, Ind. ...	1901	67
24	Grover Cleveland.....	Caldwell, N. J.....	1837	English	N. Y.	1893	56	Dem.....	Princeton, N. J.....	1908	71
25	William McKinley.....	Niles, O.	1843	Scotch-Irish ..	O.	1897	54	Rep.....	Buffalo, N. Y.....	1901	58
26	Theodore Roosevelt.....	New York City.....	1858	Dutch	N. Y.	1901	43	Rep.....	Oyster Bay, N. Y. ..	1919	60
27	William H. Taft.....	Cincinnati, O.	1857	English.....	O.	1909	56	Rep. ...	.....	....	..
28	Woodrow Wilson.....	Staunton, Va.	1856	Scotch-Irish...	N. J.	1913	57	Dem. ...	.....	....	..
29	Warren G. Harding.....	Corsica, O.	1865	American.....	O.	1921	52	Rep. ...	San Francisco	1923	58
30	Calvin Coolidge.....	Plymouth, Vt.....	1872	American....	Mass.....	1923	51	Rep.....	.....	....	..

terior. The acting president must, upon taking office, convene Congress, if not at the time in session, in extraordinary session, giving twenty days' notice. This act applies only to such cabinet officers as shall have been confirmed by the Senate and are eligible under the Constitution to the Presidency.

See CONSTITUTION; VICE PRESIDENT; ELECTORAL COMMISSION; ELECTORAL COLLEGE; CABINET; WHITE HOUSE; and separate articles on the presidents.

Presidential Election. The following table gives the popular vote for 1920:

State	Rep.	Dem.	Soc.	Pro.
Ala.	74,690	163,254	2,369	757
Ariz.	37,016	29,546	226	4
Ark.	68,874	105,618	5,074	.....
Cal.	624,992	229.191	64,076	25,085
Colo.	171,108	103,891	7,843	2,845
Conn.	229,238	120,721	10,352	.....
Dela.	52,828	39,898	1,002	998
Fla.	44,853	90,515	5,149	5,124
Ga.	41,089	107,785	465	.....
Ida.	88,975	46,579	38	9
Ill.	1,420,480	534,395	74,747	11,216
Ind.	696,370	511,364	24,703	13,462
Iowa	634,674	227,921	16,981	4,197
Kan.	369,195	185,447	15,510	.....
Ky.	452,486	456,497	.....	.....
La.	38,538	87,354	.....	.....
Me.	136,355	58,961	2,214	.....
Md.	236,117	180,626	8,876	.....
Mass.	681,153	276,691	32,265	.....
Mich.	762,865	233,450	28,947	9,646
Minn.	519,421	142,994	56,106	11,489
Miss.	11,576	69,277	1,639	.....
Mo.	727,162	574,799	20,742	.....
Mont.	109,430	57,372	.....	.....
Neb.	247,498	119,608	9,600	5,947
Nev.	15,479	9,851	1,864	.....
N. H.	95,196	62,662	1,234	.....
N. J.	611,541	256,887	25,292	3,500
N. M.	57,541	46,616	.....	.....
N. Y.	1,846,254	738,908	200,000	.....
N. C.	232.806	305,447	446	.....
N. D.	159,211	37,302	7,471	.....
Ohio	1,182,022	780,037	57,147	.....
Okla.	244,320	216,390	25,685	.....
Ore.	143,592	80,019	9,801	3,595
Penn.	1,218,215	503,202	70,021	42,612
R. I.	107,463	55,062	4,351	510
S. C.	2,632	64,170	28	.....
S. D.	109,785	35,657	.....	906
Tenn.	219,829	206,558	2,239	.....
Tex.	52,532	335,137	.....	.....
Utah	81,396	56,532	3,445	.....
Vt.	68,212	20,919	.....	774
Va.	87,458	141,617	807	826
Wash.	223,137	84,298	.....	.....
W. Va.	282,007	220,789	5,618	1,528
Wis.	498,576	113,196	80,535	8,642
Wyo.	35,091	17,429	1,234	265
Totals	16,061,278	9,181,715	885,982	153,938

Preston, Ontario, an important industrial city, is 57 miles west of Toronto, on the Speed and the Grand rivers and on the Canadian Pacific and Grand Trunk railroads. The numerous factories in Preston make stoves and furnaces, woodworking machinery, office, school and household furniture, electric and steam passenger cars, wagons and sleighs, player pianos, shoes, brushes, woolens, metal shingles, agricultural implements, flour and hockey sticks.

The electric light and power and water systems are municipally owned and operated. Braeside Sanitarium is a popular resort, and the city has good schools, three parks, a library, and broad paved streets. In 1921 the population was 5.423.

Priam, prī'am, in Greek legend, the king of Troy at the time of the Trojan War. He was the husband of Hecuba. Their many sons—fifty according to one account—were all slain during the Trojan War, with the exception of one who deserted his countrymen and joined the Greeks. Priam was slain at the fall of the city. See TROY.

Price, Sterling G. (1809-1869), an American soldier. He was born in Prince Edward County, Virginia, was educated in Hampden-Sidney College, and went to Chariton County, Missouri, to practice law. He was speaker of the Missouri house of representatives for four years, and in 1844 he was elected to Congress. When the Mexican War broke out he resigned his seat and made several successful attacks on the Mexicans in California. After joining Kearney's expedition he became military governor of Chihuahua in 1847, and the next year he won a great victory over the Mexicans at Santa Cruz de Rosales. He served two terms as governor of Missouri, from 1853-7. At the opening of the Civil War, after some hesitation, he joined the Confederates and served as major-general of the Missouri troops. At Iuka, Mississippi, he was defeated by Rosecrans, and during the remainder of the war was attached to the department west of the Mississippi. After the close of the war he lived in Mexico.

Prickly Pear. See CACTUS; BURBANK; COCHINEAL.

Priestly, prēst'lĭ, **Joseph** (1733-1804), one of the founders of modern chemistry. He was the son of an English cloth maker and was educated for the ministry, but got into theological difficulties and became a dissenting preacher. He was a friend and correspondent of Benjamin Franklin. He sympathized with the Americans during our Revolutionary War. At the time of the

French Revolution his house at Birmingham was sacked and burned by a mob. Much of his apparatus and many valuable manuscripts were destroyed. Three years later he followed his sons to America and ended his days quietly at Northumberland, Pennsylvania. Priestly suffered the misfortune of living during the closing years of the old chemistry, rather than during the opening years of modern chemistry. His work was of vast importance to other chemists who followed him, and he is quite generally given the credit of discovering oxygen, an honor which he perhaps ought to share with another. See CHEMISTRY.

Primary Election, a preliminary election according to recent laws in many of the states by which the nomination of candidates for offices is made by the voters of the different political parties. This grew out of the voluntary and independent caucuses and conventions held by the parties for this purpose, with their abuses, frauds, and boss rule. Most states now have primary election laws which prescribe the time and manner of such election, registration of voters, inspection, challenging, etc., with as great care as in the regular election. Details vary in the different states, but they usually include: nomination by petition of a fixed per cent of votes cast by the party at last election; a fee from each candidate for a place on the ballot; separate ballots for the different parties; free choice on the part of an elector as to which party ticket he shall vote; conduct of the election, method of voting, canvassing of votes, etc., similar to a general election.

Though a great improvement on the old caucus and convention nominations, there are many difficulties seemingly impossible to overcome. The great expense involved in a double election, as it were, is objectionable; and the cost in time and money to the candidate who is successful at the primary in conducting two campaigns, first for the nomination and then for the election, is bad. There has as yet been devised no way to prevent the electors of one party from voting the ticket of another, which, however, is not an unmixed evil.

Primrose, low herbs with showy, salverform flowers clustered on scapes. Some thirty species, with a wide range of color, are cultivated as house plants. They are chiefly of alpine origin,—from mountain meadows. There is no relationship to the rose. The common primrose of England is a hedge and meadow plant with tufted leaves and pale yellow flowers. Lord Beaconsfield adopted the primrose as the flower of his party and the Tory ladies wore primroses in their hats. Beaumont and Fletcher call the primrose "Merry springtime's harbinger." Milton, in *Lycidas,* speaks of the "rathe (early) primrose that forsaken dies." "Soft silken primrose," says Shakespeare. "Sweet as the primrose," says Goldsmith. Wordsworth expresses the limit of indifference to things beautiful in his oft quoted lines:

> A primrose by the river's brim,
> A yellow primrose was to him,
> And it was nothing more.

The bird's-eye primrose is a pretty plant with silvery leaves in small rosettes. The flower-stalks are three to twelve inches high and bear compact umbels of lilac-purple yellow-eyed flowers. See COWSLIP.

Prince Albert, Saskatchewan, the capital of the Prince Albert electoral district, is on the North Saskatchewan River and on the Grand Trunk Pacific and Canadian Northern railroads, 542 miles northwest of Winnipeg and 80 miles north of Saskatoon. The river is navigable between Prince Albert and Edmonton.

Power generated at the La Colle Falls of the North Saskatchewan is furnished to factories whose products include leather, saddlery, finished granite and marble, lumber, packing house products, boats, creamery products, flour and bricks. The city is the commercial center for a rich mixed farming and stock raising district.

The city is headquarters for the Royal Canadian Mounted Police of central and northern Saskatchewan, and the provincial jail and penitentiary are located here. Conspicuous among the public buildings are the Dominion land office, custom office, labor temple, land-show buildings, Victoria and Holy Family hospitals, Roman Catholic and Anglican cathedrals, the ladies college, convent, business college and collegiate institute, government armory and several fine hotels. In 1921 the population was 7,558.

PRINCE EDWARD ISLAND

Prince Edward Island, the smallest of the provinces of Canada. Its area is only 2,184 square miles, almost exactly one-tenth the size of Nova Scotia, which is the next smallest. At its greatest breadth the island is 34 miles wide, and its length is 140 miles. At two points the shore line makes deep indentations, almost cutting the island into three parts; at one of these points, at high tide, there is only a mile of dry land beween the north and south shores. In shape the island is a rough crescent, with its open side to the Gulf of Saint Lawrence, and its back to New Brunswick and Nova Scotia, from which the island is separated by Northumberland Strait. For the most part the coasts are low and sandy, especially on the north, where there are many fine beaches.

THE PEOPLE. As the smallest province, Prince Edward Island naturally has by far the smallest population; it was 88,615 in 1921. This figure gives the province a greater density of population per square mile, 40.56, than any other province, but it shows an actual decrease not merely from the preceding census of 1911 but from the first Dominion census of 1871. The following table tells the story of these fifty years:

Year	Population	Increase or Decrease	Increase for Dominion
1921 ...	88,615	—5.4	21.7
1911	93,728	—9.2	34.1
1901 ...	103,259	—5.3	11.1
1891 ...	109,078	0.2	11.8
1881 ...	108,891	15.8	17.2
1871 ...	94,021	....	...

From this table it appears that only during the first decade of the Dominion's history did the population of Prince Edward Island increase approximately on a par with the rest of the Dominion. The reason for this is the emigration to the Canadian Northwest, which has been so heavy that it has not been offset by the natural increase in population and by immigration. Unlike its neighbors, New Brunswick and Nova Scotia, both of which have also been heavy losers by emigration, Prince Edward Island lacks the variety and size of industry to draw new settlers to replace those lured away.

INDUSTRIES. Yet it must not be supposed that Prince Edward Island is totally lacking in industries. It is essentially a farming community, about one-seventh of the population being farmers who own their farms. Practically the entire area is cultivable. The soil is a light loam, often covered by a layer of decayed vegetable matter and usually underlain by sandstone and clay. For years the farmers took from the soil all they could, without replacing any elements, with the result that fertilizer is necessary now to obtain satisfactory crops. The fertilizer commonly used is dredged from the bays and river beds, and carries the descriptive name of "mussel mud". It consists of the organic remains of shell fish, embedded in a mud-like sediment, and appears suitable for any crops. Oats, potatoes and turnips, each with an annual crop in the neighborhood of six million bushels, are the leading products. A million bushels of wheat and half a million tons of hay and clover are average yields. Corn is raised chiefly as feed for hogs, cattle and horses. Butter and cheese have been made commercially since about 1890 and dairy farming is increasing in importance. Fur-farming, now practiced in many other places, was for a number of years unique in Prince Edward Island. It is estimated that this industry represents a capital value of about $20,000,000.

Once Prince Edward Island was covered with forests, but now more than three-fourths of the land has been cleared. Birch, beech, maple, cedar, spruce and pine are the common varieties. In earlier days the abundance of lumber made shipbuilding important, but after 1880 this industry declined and now has almost disappeared. The only other industry of consequence is fishing which gives employment to nearly a tenth of the island's population. The lobster catch is worth about 60 per cent of the total annal average ($1,500,000), while cod, herring, oysters, smelts and mackerel make up the balance. The packing and preserving of fish, with the possible exception of dairy products, is the only real manufacturing industry on the island.

GOVERNMENT AND EDUCATION. The government is like that of all the other

provinces. It is officially headed by the lieutenant-governor, who is appointed by the Canadian governor-general in council, but real administrative authority is vested in the premier and his council of department heads. The province has a single legislative chamber of 30 members. There are three counties, Prince, Kings and Queens, of nearly equal size. The county towns, respectively Summerside, Souris and Charlottetown, are the largest towns, and are the only considerable settlements on the island. Charlottetown is the provincial capital.

The public school system was established in 1851, and elementary education since that date has been free. There are two colleges, Prince of Wales College, the head of the public school system, and Saint Dunstan's College, a Roman Catholic institution, both at Charlottetown.

HISTORY. The first white man known to have landed on Prince Edward Island was Jacques Cartier, the French explorer, in 1534. Cartier, however, seems to have believed that he was on the mainland, and it was not until 1603 that Champlain formally took possession of the island for the king of France. The French made several attempts to colonize the island, but there were no more than 4,000 settlers when it passed into British hands in 1763. The British divided the land into townships of 20,000 acres each, and granted many of these to speculators and other non-residents, thus laying the foundation for the system of absentee land-ownership which cursed the island for a full century. Absentee ownership was not abolished until 1876.

Under French occupation, and during the first quarter century of British rule, the island was called Isle Saint Jean (St. John). It was then, in 1798, changed to Prince Edward, in honor of the Duke of Kent (father of Queen Victoria), who was then commanding the British troops in America. At Charlottetown was held the conference of 1864 which paved the way for the Quebec Conference three years later and the subsequent confederation of the Canadian colonies. But Prince Edward Island refused to join the Dominion until 1873, and long thereafter complained about the smallness of the subsidy derived from the Dominion government and also about the need for a tunnel under Northumberland Strait. The Dominion government has not yet built such a tunnel, but it does operate the railways on the island as a part of the government lines. The reduction of the province's representation in the Canadian parliament, as a result of declining population, has also been a source of political friction. In the main the course of local politics has followed the traditional division between Liberal and Conservative.

STATISTICS:

Area, square miles	2,184
Population, 1921	88,615
Charlottetown	12,347
Souris	1,094
Summerside	3,228
Urban population, per cent	21.5
Chief crops:	
Hay and clover, tons	500,000
Oats, bushels	6,000,000
Potatoes, bushels	6,000,000
Turnips, bushels	6,000,000
Wheat, bushels	1,000,000
Fish, annual catch, value	$1,500,000
Capital in fur farms	$20,000,000
Members in provincial assembly	30
Members in Dominion Senate	4
Members House of Commons	4

Prince Rupert, British Columbia, an important port on the Pacific Ocean and the western terminus of the Grand Trunk Pacific Railroad, is 500 miles north of Vancouver. The city is on the north end of Kaien Island, north of the mouth of the Skeena River, and only 35 miles south of the southernmost point of Alaska. The island has an area of about 11,000 acres and is seven miles long. Prince Rupert has direct steamer connection with other Pacific Canadian ports, American ports and Japan.

The harbor is deep and commodious and because of the mild climate is open all year. In 1923 there were 7,040 front feet of wharfage and a 600 foot dry dock here and other harbor improvements were in prospect. Prince Rupert is the outlet for a very rich lumbering, mining and agricultural district, and the city is the center of a thriving halibut and salmon fishing industry. There are factories producing lumber, fish fertilizer and many other commodities.

The city has a government wireless station, a customs house, a quarantine hospital, a marine station, schools, parks and numerous hotels. There are churches of a number of denominations. In 1921 the population was 6,376.

Prince of Wales, a title conferred usually by the sovereign of England upon his oldest son and heir. The custom originated in the day of Edward I, who after conquering Wales, bestowed that title upon his infant son, who was born in Wales. The title was calculated to appeal to the pride of the Welsh, who had lately been conquered by the English. Thus, when Queen Victoria's oldest son, later King Edward, was born, she made him Prince of Wales. When he became king, the title was extinguished, except that he chose, in accordance with custom, to bestow it on his oldest son. In all ceremonial functions the Prince of Wales is entitled to a place next to that of the sovereign.

Princes Islands, a group of small islands situated 13 miles southeast of Constantinople, in the Sea of Marmora. The islands have connection with Constantinople by means of ferries, of which there are a large number. Of the islands, Prinkipo is the largest and most important. Large monasteries occupy many of the islands, and add to the general mystery which surrounds them. But four of the islands contain people. In 1894 an earthquake occurred which caused a great loss of life and property.

Princess, The, a Medley, a narrative poem by Alfred Tennyson, published in 1847. The body of the poem is in blank verse, but it contains several exquisite lyric poems. The story is of a college for women, founded by women — men being excluded entirely. The theme is the ideal character and sphere of woman in all her glory.

As for the various characters in the poem, they give all possible views of woman's higher education; and as for the heroine herself, the Princess Ida, the poet who created her considered her as one of the noblest among his women. The stronger the man or woman, the more of the lion or lioness untamed, the greater the man or woman tamed. In the end we see this lioness-like woman subduing the elements of her humanity to that which is highest within her, and recognizing the relation in which she stands toward the order of the world and toward God.—Lord Tennyson.

Princeton, a college town of New Jersey. It lies midway between New York and Philadelphia. It was settled in 1696. The first legislature of New Jersey to meet after the Declaration of Independence sat here. January 3, 1777, Washington surprised Cornwallis' reserves here. Moved by the threats of soldiers clamoring for their pay, the Continental Congress met here instead of in Philadelphia, and was yet in session October 31, 1783, when tidings of the signing of the treaty of peace arrived from England. The population of the town is about 6,000. It derives its importance chiefly from the presence of Princeton University. This institution was founded by the Presbyterians of Philadelphia. It was known first as the College of New Jersey. It was moved from Newark to Princeton in 1756. Although bearing the name of university, professional schools have not been organized. The institution has an income-producing endowment of between $2,500,000 and $3,000,000, with an annual income of over $300,000 a year. About 1,500 students are in attendance. The library includes many valuable special collections of books and manuscripts; in all, about 200,000 in number. The college has a beautiful campus of 225 acres. Fraternity chapters are not permitted. Two literary societies dating prior to the American Revolution are still supported loyally. The city is the seat also of Princeton Theological Seminary, a leading institution of the Presbyterian church.

Print, a light cotton cloth, woven either plain or twilled, ornamented with printed patterns. The name is specifically applied to calico, but there is quite a variety of printed cottons, such as drapery prints, used for curtains and furniture coverings, and including many different weights and qualities of cotton cloth; indigo prints, ornamented with an indigo-blue ground and white pattern; robe prints, used largely for bed comforts; dress prints of many varieties, and shirting prints. See PRINTING; CALICO; INDIGO.

Printing, as usually understood, the production of reading matter or cuts on paper or other material by means of type and ink. The ancient Assyrians appear to have possessed the art of printing from tablets of

burnt clay. As early certainly as the sixth century, the Chinese and Japanese printed passages from their religious books by means of movable wooden blocks. These they arranged as we do metal type. A few centuries later they used movable type of porcelain. The British Museum possesses books printed in Korea as early as 1337. The seal of Cicero's day, with which an impression was made in sealing wax, was, in its way, a kind of type. To go no farther back, William the Conqueror and other princes of his day had monograms engraved on blocks of wood with which to sign charters. They were used as are the rubber stamps now found in offices.

During the Middle Ages books were made by hand. Writing, copying, and illuminating were fine arts. Printing from wooden blocks on silk cloth, vellum, and paper seems to have made its appearance in Europe as early as the twelfth century. Entire books were produced in this way. Each page was engraved on a block of wood. Sometimes one part of the page was devoted to a picture and the rest to text. Whether picture or text, each page was practically a woodcut. Playing cards were produced likewise from a set of blocks. Books produced in this way were not uncommon in 1400. Block printing may be regarded as the immediate ancestor of the art of printing as now practiced.

The honor of inventing movable types is ascribed usually to Johann Gutenberg, who labored in secret at Strasburg and made his processes known in his native city of Mainz in 1456. Gutenberg's types were small blocks of wood. Peter Schoeffer, his assistant, is thought to have suggested metallic type cast in plaster molds. The various sizes of type were indicated formerly by names as great primer, English, pica, small pica, long primer, bourgeois, brevier, minion, nonpareil, agate, pearl, diamond, and brilliant. Toward the close of the nineteenth century, sizes were indicated more closely by numbers as follows:

Nonpareil	6 point
Minion	7 point
Brevier	8 point
Bourgeois	9 point
Long Primer	10 point
Small Pica	11 point
Pica	12 point

The body of the text in this work is printed in ten point. Many of the quotations are printed in eight point.

The first printing presses were modifications merely of an old-fashioned wooden cheese press or cider press. The essential parts of the press were contained between two upright wooden beams. When ready for printing, the type, or form, as it is called, was placed, face upward, on a bed similar to that designed to receive cheese. It was then inked with a ball of soft leather. A sheet of paper was spread over the type. An upper surface, called a platen, was pressed down upon the paper by means of a wooden screw. When an impression had been made the screw was reversed, the sheet of paper removed, the type re-inked, and another sheet put in place. It is claimed that the printing done with these simple presses has not been surpassed for quality of workmanship.

The press used by Benjamin Franklin in London in 1725 possessed a device for rolling the bed in and out to facilitate the handling of the paper. A press of this sort is shown in the patent office at Washington. In 1816 George Clymer, a Philadelphia manufacturer, devised a system of quick-acting levers to take the place of the tedious screw. London printers suggested toggle-joints, a device by means of which a great pressure can be applied quickly. From this time on the improvement of printing presses went on very rapidly. The number of patents both in this country and abroad reaches into the thousands. Two improvements are especially notable.

In the early part of the nineteenth century, a new press was produced in London. The form of type was placed, as before, on a flat bed and was covered by the sheet of paper, but the impression was produced by a rolling cylinder instead of by a flat platen. In 1845 Richard Hoe, a New York manufacturer of printing presses, conceived the plan of fastening the type to the outside of a large cylinder. He invented V-shaped rules, thick at one edge and thin at the other, by means of which the lines of type were spread farther at their outer end than at the inner, thus giving the body of type the curvature requisite to fit the form to the cylinder. The impression was produced

as before by rollers. Paper was fed, in fact, between two cylinders, one smooth, the other bearing the type. Then came stereotyping. Without going into the details of the modern printing press, it may be said that any number of stereotyped forms may be taken from a form of type, and that a number of presses may work at the same time to print large editions.

Newsprint paper is manufactured in rolls, each roll containing approximately five miles of paper, which is fed through the press by the revolution of the cylinders, which draw the paper along. Both sides of the paper are printed at once, and when the press is operating at full speed the paper travels at the rate of about ten miles an hour. As fast as they are printed the sheets are cut, folded and counted ready for delivery by a machine attached to the press. When more than one sheet of paper is required, as in large city dailies, there is a set of cylinders for each sheet and the press is so arranged that these sheets are delivered to the folding machine in the order in which they appear in the newspaper. Hoe's double octuple rotary press prints eight rolls of paper, each roll containing five miles of paper double the width of the ordinary newspaper. One of these presses will print, cut, fold and deliver 96,000 copies of a thirty-two page newspaper an hour. Such a machine is fifty-four feet long, nineteen feet high and twelve feet wide.

The first printing press in America was set up in the city of Mexico in 1535. About 1584 one was established at Lima, Peru. The first in the American colonies was established at Cambridge in 1639. The first press in Virginia, 1681, was silenced by a royal command to "allow no person to use a press on any occasion whatever."

Color Printing. Some printing presses are arranged for printing more than one color at the same time. Such presses are used in printing the colored sections of Sunday papers and in printing advertising matter. The pictures are cheap and the colors are usually poor. However, beautiful illustrations in color, such as those found in the Standard Reference Work, are produced by means of the printing press. These pictures are made by printing three colors—yellow, red and blue—one over the other, a special set of electrotypes being used for each color. When the picture requires it, a fourth color—black—is added. This style of illustration has been made possible by the development of photography. See Photography.

Statistics. The following statistics are taken from the Bulletin on Manufactures, census of 1920.

Number of establishments	32,476
Wage earners	287,278
Capital	$1,191,505,247
Wages	$341,519,423
Cost of material	$571,510,277
Value of products	$1,699,789,229
Horse power	362,123
Book and Job Printing:	
Number of establishments	13,089
Wage earners	123,005
Capital	$446,554,984
Wages	$141,476,243
Cost of material	$211,067,174
Value of products	$597,663,228
Newspapers and Periodicals:	
Number of establishments	17,362
Wage earners	120,381
Capital	$614,045,344
Cost of materials	$144,348,173
Value of products	$924,152,878

See Gutenberg; Aldus; Caxton; Elzevir; Book; Paper; Newspaper; Ink; Linotype, etc.

Printing, or Calico Printing, the process of impressing designs of one or more colors upon fabrics. Not only cotton, but woolen, silk, and linen textures, may be printed, as well as unwoven yarns.

Printing is a complex process, enlisting the arts of designing, engraving, and dyeing, as well as the science of chemistry. While classed among the processes of manufacture, calico printing, as it is called, stands very close to the fine arts; since the printer must understand how to arrange colors harmoniously, how to make various shades relieve each other, just which colors in a design should be clear and brilliant and which tints or shades are more effective. He must know how to make the pattern, or certain parts of the pattern, stand out more or less distinctly according to the tone of the ground color. In fact, he must know color as an artist knows it.

It is supposed that the art of printing cottons and linens originated in the far East. Mention is made by historians, as early as 327 B. C., of the fine flowered chintzes of

India, and it is probable that the art had been practiced to some extent for centuries. The printing of textiles was introduced into Europe toward the close of the seventeenth century. The pattern was laid upon the cloth with a *mordant,* that is, a substance which penetrates and sometimes has an affinity for the fibers, and at the same time possesses the property of forming an insoluble compound about the fibers with the coloring matter subsequently employed. If, therefore, a number of different mordants were used on different parts of the white cloth, the dye bath would produce different colors or shades in the result. The finished print was often both durable and beautiful, but the method was tedious. About the middle of the eighteenth century, Robert Peel, grandfather of Sir Robert Peel, the statesman, invented block printing. Wooden blocks were so engraved that the pattern stood out in relief. A block was prepared for each color. The blocks were furnished with handles, and with brass pins at the corners which served as guides in the regular distribution of the pattern and in bringing different parts of the pattern into exact juxtaposition, when several blocks were required for the several colors of the same design. The cylinder printing machine was invented in 1785, since which time improvements have followed each other in rapid succession until the process seems well nigh perfected. At Fall River, Massachusetts, twenty-five yards of cloth can be printed with patterns involving sixteen colors in the space of one minute.

At the present time methods and processes of printing vary according to material, style, and quality desired. Some firms purchase the raw cotton and put it through all the various processes,—spinning, weaving, bleaching, singeing, shearing, mercerizing, printing, together with the numerous washings, steamings, and dyeings which fabrics must undergo before they are ready for the market. In most cases, however, the cloth is woven elsewhere and received at the "print-works" in its unbleached state —"in the gray" as it is called by manufacturers. The cloth is first singed, then bleached. It must be bleached until chemically pure, or the action of the dye might be interfered with. After bleaching, the cloth is sheared or cropped. The next process is starching, which is done to fill up the spaces between the threads, so that the pattern will be imprinted more plainly. The patterns are engraved on copper cylinders about three and a half feet long by six inches in diameter. A different cylinder is required for each color of the pattern. If the pattern is to be printed in one color, the entire design is engraved on one cylinder. If two or more colors are desired, a part of the design only is engraved on each cylinder, the work being done so carefully that when the cloth is carried over one cylinder after another, the various parts of the pattern will come into exact juxtaposition, producing a complete and perfect design. These cylinders are placed in a printing machine which will carry any number up to twenty. Each cylinder is fed with its own color by a roller which revolves in a dye trough or "color box." In simple patterns, as stripes, three colors may be produced from two printings, or the use of two cylinders. This is done by allowing the two colors to overlap, thus forming a third color.

In printing, the white cloth is wound on a huge drum and fed to the press like a roll of paper. As the web passes through, it receives the imprint in color from each cylinder and emerges as "print." The colors are not always apparent at first. Certain processes may be necessary to bring them out. This is due to the fact that a mordant has been used with the color, or must be used after the colors are imprinted, to cause the dye to unite permanently with the fiber. In other instances the mordant is printed upon the goods, and may be in part or wholly invisible until subsequent dyeing and washing gives color to the design imprinted with the mordant and leaves the remainder of the fabric white.

According to the most common method of printing, called technically the "steam style," each color or dye is mixed with its own particular mordant before printing. After leaving the printing machine the cloth is subjected to the action of live steam, which causes the chemical combination of color and mordant, and induces the absorption of this compound by the fiber. The steaming process requires experience, care,

and judgment, as no fixed rules can be laid down as to the length of time the goods should be steamed, the amount of moisture used, etc.

Various other methods of combining mordant and dye to produce different effects are in use. They are named from the dye with which they were first used, as "Madder style," "Indigo style," etc., or from some distinctive feature of the process, as "Discharge style," "Resist style," or "Bandana style."

The old block method of printing is used in place of the cylinder machines for printing very sheer textures, such as netting and chiffon; also for some mixed goods and for cloth over forty inches wide. It is also used in warp printing to produce effects impossible to obtain by printing directly on cloth. In warp printing, the warp is mounted on the loom as for ordinary weaving. A few wefts are woven into it at distances of a few inches apart. It is then removed from the loom, stretched on tables, and the open warp printed in designs by the block process. The warp is returned to the loom and is woven as usual. The design is, of course, less distinct than when printed on a woven web, but the process produces a peculiar and pleasing effect.

See SINGEING; WEAVING; BLEACHING; CALICO; DYEING; MORDANT; BANDANA.

Prism. See COLOR.

Prison, a place of confinement. Probably the first prison was a cave. The earlier prisons of which we have record were round, underground affairs, constructed not unlike a jug. The prisoner was let down through an aperture corresponding to the hole for a cork. The prison into which Cicero thrust his state prisoners at Rome was a cell of this sort. Modern prisons have grown out of the old underground dungeon of the medieval castle. In early days prisoners were confined in one or more large compartments, which were not unaptly stigmatized as schools of vice. It was almost impossible for a young prisoner to herd with hardened criminals without becoming worse rather than better for his imprisonment. John Howard, a philanthropical Englishman, was one of the earliest reformers to call attention to this condition of affairs. An excellent description of the English debtor's prison may be read in Dickens' *Little Dorrit*. In one or another of his novels he describes the noted criminal prisons of London.

A great improvement has taken place in the sanitary condition of prisons since Dickens' day. It is no longer considered civilized to confine prisoners in filthy, unhealthful quarters. Under the names of lockup, jail, workhouse, reformatory, and penitentiary, a great variety of prisons exists in the United States. It is considered the duty of the grand jury to investigate the condition of county jails.

In state prisons, or penitentiaries, two systems have prevailed. Under the solitary system the prisoner is confined in a room entirely by himself, where he is required to work during work hours, to eat his meals, and to sleep. He is not permitted to catch sight of his fellow prisoners. He is visited only by guards and by those engaged in missionary work, but he is allowed books and magazines. This form of imprisonment is thought by many to lead to insanity. The other system is that of causing prisoners to labor together in large shops during the daytime. They march to their meals in large dining rooms. At night each is confined in his tiny cell. With the exception of Christmas or some holiday, conversation or communication of any kind, except with the guards, is forbidden. The slightest attempt at disobedience is punished severely.

Of late much attention has been paid to the study of prison discipline or penology, as it is called. There is an American association composed of members from the United States and Canada. There is a British association as well. New York state has led in the matter. The state prisons of Elmira and Auburn are considered models. Latterly the opinion has gained ground that prisoners should be sentenced for an indeterminate length of time, in no way to exceed a certain maximum fixed by the court. According to this view, imprisonment is regarded as a means of correction, of changing a criminal's views of life, rather than as a mere punishment. In many penitentiaries a convict is able to shorten his sentence by good behavior. If in all respects obedient to the rules of the warden,

he is able to shorten his sentence materially. In most states and provinces separate institutions are provided for hardened criminals and for those that give promise of reform.

Privateer. See PIRACY.

Privet, prĭv′ĕt, a genus of shrubs belonging to the olive family. There are about thirty-five species native to the Mediterranean region and farther Asia. The common privet is much used for hedges. It is an erect, handsome shrub that bears trimming well, and thrives in exposed, dry situations or in the shade and under the dripping of buildings equally well. The leaves are of a handsome green. The flowers are white and fragrant. Privet retains its black berries during the winter. A pink dye is made from them. The wood of some of the larger species makes excellent shoe pegs. Privet hedges are common in England. The common privet is hardy in the northern part of the United States. Other species are confined to the Southern and Middle States.

Privy Council. See ORDERS IN COUNCIL.

Privy Seal. See SEAL.

Probate. See COURT.

Proconsul, in Roman law, a deputy consul appointed to the command of a province. He was usually a man who had served as a consul or praetor, but, when public service required, the position could be filled by those who had not held office previously. As communication was uncertain and the power of the proconsul practically absolute, he had a large degree of responsibility, with opportunity to distinguish himself by an upright administration, as well as opportunity to enrich himself by extorting money from his wealthy but defenseless subjects. Unfortunately the office was looked upon too often as a means of becoming wealthy. A saying is attributed to one of these office-holders, which, though it may not be true literally, illustrates the condition of public service: "I shall need three years," said he, "one in which to provide for my friends, one in which to provide for myself, and one in which to amass the means necessary to corrupt my superiors." Such men expected to retire from office, erect villas, and live in wealth for the remainder of their lives. See CONSUL.

Procter, Adelaide Anne (1825-1864), an English poet, daughter of Bryan Waller Procter. Her first verses were published in *Household Words* in 1853. They attracted the notice of Dickens, who gave the young author hearty encouragement. She produced many poems published under the title, *Legends and Lyrics.* Some of her songs have been set to music, *The Lost Chord* being the most famous among them.

It is like telling one's beads, or reading a prayer-book, to turn over her pages—so beautiful, so pure and unselfish a spirit of faith, hope, and charity pervades and hallows them.—Stedman.

Procter, Bryan Waller (1787-1874), an English poet who used the pen name of Barry Cornwall. He was born at Leeds. He was educated at Harrow and later studied law in London. He wrote dramas, songs, and several prose works. *Mirandola,* a tragedy, was performed successfully in 1821. His prose works include *Portraits of the British Poets, Life of Edmund Kean,* and *Memoir of Charles Lamb.* He is best known, however, for his *English Songs,* a volume containing 172 short poems. These have been highly praised by Mr. Stoddard and by Edmund Clarence Stedman. Probably there is no one of the *English Songs* more widely known than that entitled *The Sea,* which Mr. Stedman mentions as "fresh with the sprayey breeze of ocean, and echoing the innumerous laughter of waves that tumble round the singer's isle."

The sea! the sea! the open sea!
The blue, the fresh, the ever free!
Without a mark, without a bound,
It runneth the earth's wide regions round;
It plays with the clouds; it mocks the skies:
Or like a cradled creature lies. . . .

I never was on the dull, tame shore,
But I loved the great sea more and more,
And backwards flew to her billowy breast,
Like a bird that seeketh its mother's nest;
And a mother she *was* and *is* to me;
For I was born on the open sea!

The waves were white, and red the morn,
In the noisy hour when I was born;
And the whale it whistled, the porpoise rolled,
And the dolphins bared their backs of gold;
And never was heard such an outcry wild
As welcomed to life the ocean child!

Proctor, Alexander Phimister (1862-), a Canadian sculptor and painter, was born at Bozanquit, Ontario, but removed to the United States while very

young. As a boy he made many sketches of wild animals in their natural surroundings in the Rocky Mountains, and when opportunity came he studied at the National Academy of Design and at the Art Students' League, New York. Later he went to Paris and studied under Puech and Injalbert. During this time his genius was maturing, and at the Chicago World's Fair his work attracted attention for its power and personal qualities. Many of his animal groups and paintings are conceived with striking originality. Mr. Proctor was awarded gold medals at Paris, St. Louis and San Francisco. The best known of his works are the *Panther* group in Prospect Park, Brooklyn, N. Y., *Fate,* in the Metropolitan Museum; *Dog With Bone;* the *Lions* group on the McKinley Monument, Buffalo, N. Y.; *The Puma, The Fawn,* and many other successes.

Proctor, Richard Anthony (1837-1888), an eminent English astronomer, and one of the world's greatest popularizers of science. He was born at Chelsea, London, and educated at King's College, London, and at Cambridge. He began the study of law, but in 1863 took up astronomy and mathematics. Mr. Proctor later contributed articles to the *Popular Science Review*, and edited the *Proceedings* of the Royal Astronomical Society in 1872-73. In the latter year, Mr. Proctor made a lecture tour in the United States, meeting with unusual success. Again in 1875-76, 1881, and 1884 he toured the United States, settling in Missouri in the latter year. In 1881 he founded in London a weekly paper called *Knowledge,* which later became a monthly. As a lecturer, Mr. Proctor was always popular because he possessed a natural gift of presenting difficult subjects with the utmost lucidity. Among his publications are *Saturn and His System, Half Hours With the Telescope, Handbook of the Stars, Our Place Among Infinities, Flowers of the Sky, The Poetry of Astronomy, The Seasons* and *Familiar Science Studies.*

Profit-Sharing, the principle or method of making a division of realized profits between the capitalist, the employer and the employe, in addition to regular interest on investment, salary and wages. As understood in political economy, profit means what is left of the product of industry after deducting the agreed amount of wages, the cost of raw materials, and the rent, etc., paid in the course of production; and is considered as composed of three parts, namely, interest, risk or insurance, and wages of superintendence. Profit-sharing is a modified form of the wages system by which wage-earners receive part of the surplus of the industry, according to a plan agreed upon.

Profit-sharing plans for the improvement of the relations between capital and labor have been the subject of experiments by philanthropic employers in the United States at intervals ever since the establishment of the Republic. Albert Gallatin tried such a plan in his Pennsylvania glassworks in 1794. In Cincinnati, St. Louis, and other cities large manufacturers have inaugurated various plans with more or less success since 1886, but it was not until the early years of the twentieth century that general attention was directed to this development of the factory system. Since then plans of profit-sharing have become common in industry. Their object is to give the individual workman a personal interest in the success of the concern which employs his labor, and thus to retain his allegiance and continued services. The theory is believed to be sound.

Among the profit-sharing plans now in effect are the following: (a) A certain percentage of the net profits may be turned over for division among the workmen; (b) stock in the concern may be assigned to them; or (c) what is known as the co-operative piece system may be used. In the latter the labor cost is fixed for each piece and the total gain on this is divided among the workmen. This plan is said to have worked well in some cases, having exerted a good effect upon the body of workmen as a whole.

Profit-sharing plans, like all movements designed by one class for the benefit of another, have their opponents. Some leaders of organized labor see in such plans only an attempt on the part of employers to bribe labor and keep it satisfied with exist-

ing conditions as regards hours and wages, by "throwing a sop" to the workman in the form of a small share of the profits. The manufacturer or other employer who advocates the profit-sharing system, on the other hand, regards it as good business policy. He believes that it pays thus to secure the personal interest of the individual workman in the success of the whole organization, even though it be known that the great bulk of the profits goes into the pockets of the owners.

The United States Steel Corporation, in 1903, announced a plan of profit-sharing for its employes, which was followed soon after by a similar plan inaugurated by the International Harvester Company. George W. Perkins, the well-known financier, who was interested in both these corporations, said: "There should be no sentimental philanthropy about this great question. It is purely a business question. Profit-sharing, pensions and the like, from a pecuniary standpoint, are a profitable thing for a business and also for its labor, or for neither. No American, worthy of being called a man, wants something for nothing."

The profit-sharing plan of the International Harvester Company included, first, the setting aside of a certain sum of money out of the company's earnings each year, for immediate distribution in cash among the employes who made a satisfactory showing for the year, in increased sales, reduction of selling expense, increased production, decreased cost, or a combination of both the latter items. Second, the sale of the company's stock to its employes on the installment plan, with a special annual bonus on each share of stock thus purchased. Thousands of the employes availed themselves of this opportunity to become stockholders in the Harvester concern, while 27,000 employees of the Steel Corporation bought stock the first year it was offered to them.

Somewhat similar plans have since been adopted by many other large corporations, and there are now in every city of the United States numerous small employers who also make an annual distribution of part of their profits among their employes. While it may not in all cases have secured the results desired, it can be said that, as a rule, profit-sharing works well in promoting goodwill, loyalty and cooperation between employer and employed.

Progression, a series in which the terms bear the same mathematical relation to each other. If the relation is one of difference it is called arithmetical progression, and the constant quantity added is the common difference. The series increases when the difference is positive and decreases when the difference is negative. For example, if one term is 7 and the common difference is 4, the progression increases positively as follows: 7, 11, 15, 19 . . . ; negatively the series becomes 7, 3, -1, -5, etc. The series is called limited when it has beginning and end; if not it is called infinite. When any increasing or decreasing progression is limited, the value of any term may be obtained by adding to the first term the product of the common difference, or constant, by the number of terms that precede the one to be determined. Half the sum of the extremes of such a progression multiplied by the number of its terms will give the sum of all the terms.

In a geometrical progression the series increases or decreases according as it is multiplied by a constant which is either greater or less than unity. The constant multiplier is called the ratio. The progression is increasing when the ratio is positive and less than one. When the ratio is negative, the terms become alternately positive and negative. To illustrate: If the ratio is -2, and the first term of a limited progression is 8, the series advances as follows: 8, -16, 32, -64, etc. If two consecutive terms are known the ratio is obtained by finding the quotient of the two.

A harmonical progression is a series in which the arithmetical progression is formed by the reciprocals of the terms. The first of any three consecutive terms, then, is to the third as the difference between the first and second is to the difference between the second and third.

Progressive Party, the name of the political party that was organized at Chicago in 1912 as a radical offshoot of the Republican party. It might be said that the

conservatism of President Taft was the final cause of the organization of the party, for it was sponsored by that radical element in the Republican party that was opposed to Taft, and especially to his renomination. But the party had its remoter origin in the political agitation as far distant as 1890.

Under the leadership of Robert W. La Follette of Wisconsin a progressive Republican campaign was inaugurated in 1890, and after that date the movement toward change gathered volume and force. At the 1912 convention Theodore Roosevelt was the strong Liberal candidate, but Taft delegates were seated in numbers large enough to insure renomination. The leaders of the progressive elements, after entering a charge of fraud, withdrew from the convention, organized the new—Progressive—party, and nominated Roosevelt for President with Hiram W. Johnson, then governor of California, for Vice-President.

At the following election the Progressives polled a larger vote than did the Republicans, but in the elections of November, 1914, it was shown that their influence had diminished. In 1916, however, they held a national convention in Chicago and again chose Roosevelt as their Presidential candidate. He declined to run and the weight of the Progressive leaders was thrown to Charles E. Hughes. In the election of that year, and subsequently, they were defeated, but in 1923 the party was active and had influence.

Most of the Progressive Republican Senators and Representatives in the Sixty-Seventh Congress were members of the so-called Agrarian Bloc, which was influential in securing the enactment of laws favorable to agriculture.

Prohibition Party, a political party of the United States. Its avowed purpose is the prohibition of traffic in alcoholic drinks. It was organized in 1869. The party put its first presidential ticket in the field in 1872, receiving 5,607 votes. The candidates in 1900 received 207,820 votes; in 1908, 253,119. The party has refused to take up other issues. The single issue was defined clearly by the national platform of 1892:

"The liquor traffic is a foe to civilization, the arch enemy of popular government, and a public nuisance. It is the citadel of the forces that corrupt politics, promote poverty and crime, degrade the nation's home life, thwart the will of the people, and deliver our country into the hands of rapacious class interests. All laws that, under the guise of regulation, legalize and protect this traffic, or make the government share in its ill-gotten gains, are 'vicious in principle and powerless as a remedy.' We declare anew for the entire suppression of the manufacture, sale, importation, exportation, and transportation of alcoholic liquors as a beverage by federal and state legislation. The full powers of government should be exerted to secure this result. No party that fails to recognize the dominant nature of this issue in American politics, deserves the support of the people."

The candidate for president on the Prohibition ticket in 1912 received 206,427 votes. In 1915 prohibitory laws were in force in Maine, Kansas, North Dakota, Alabama, North Carolina, Georgia, Mississippi, Oklahoma, Virginia, West Virginia, Arizona, Colorado, Oregon and Washington. In South Carolina the sale of liquors at retail was for a time restricted to agents chosen by the state under a statute known as the Dispensary Law. In all of the states the voters were authorized to exclude the liquor traffic from their respective localities. They did so in many counties, towns, and cities, and in 1919, by ratification of an amendment to the Federal Constitution, the United States prohibited all traffic in intoxicating liquors, to take effect January 16, 1920. The following speech by Secretary Jerry Sullivan at the May, 1909, meeting of the International Bartenders' League of America is an interesting and prophetic view of what has now come to pass:

We are free to admit that our opponents have caused us some annoyance; that we surrendered doing business with former locals with mighty poor grace, and gave vent to fervid hope that the apex of the wave that was sweeping over the land had passed and that tranquil conditions would be with us long ere this. Instead of realizing our wishes, we are still confronted with the increased momentum of the storm; a storm that has been vigorous and unceasing, destroying with what seemed little effort locals whose foundations appeared to be unshakable, scattering the members of such to all four points of the compass, some carrying mental wounds that will not heal short of several years of steady employment under most favorable conditions.

I would be guilty of reckless assertion and unfaithful to my trust were I to hold out to you surcease from these troubles in the very near future. The opposition to licensed cafés and saloons, which affects every man and woman in this

International Union, has, according to the best authorities, but started seriously to impose restrictive legislation; they have just begun, and if what has been accomplished is any criterion to go by, when they get started there is no telling where they will finally stop.

Originally the prohibition agitators were regarded with little or no concern. That has changed within the last six years to such an extent that their campaign for "dry legislation" has actually become the greatest movement this country has ever witnessed, compelling attention but very little positive, tangible, aggressiveness on the part of those whose interests were at stake. In fact we make bold to assert that our international union has done more campaigning in opposition to the anti-saloon agitators than all of the other allied organizations directly and indirectly connected with the traffic. It seems but a few short years since the opposition could only boast of two dry states, Maine and Kansas, aggregating a total of something like 115,120 square miles of territory; today they can boast of 407,602 square miles under state prohibition, and 1,836,895 square miles under local option laws, while there remains to us, and those like us, that depend on the traffic for a livelihood, exactly 1,303,249 square miles undisturbed by restrictive legislation. That means more than two-thirds of the United States where the saloon and cafés where intoxicating beverages were formerly sold have gone out of business and those who were employed swallowed up in that fearfully and ever-increasing national problem, the army of the unemployed.

To you fellow members and those whom you represent, the question is not one of ethics, but of your future salvation; it is down to that common ground where that home expression is apropos: it's a case of talking brass tacks; it means bread and butter for you and those dependent on you. You and your members are right where you must decide what you can and shall do to retain what you have; if you belong to the indifferent guards, you will smile and say that you will wait until it happens to you before you worry; several thousands of your fellow members occupied that position and declined to wake up; they are roaming around the land now seeking jobs at any price or at any vocation. If your future bread and butter is worth five, ten, or fifteen cents a week; if you have the backbone to take a chance and are willing to put up the coin, you will enable those whom you elect as your executive board, to lay plans and follow out a campaign that may prove successful; it will at least give your representatives an opportunity of teaching some of the citizens of the land that prohibition spells idleness for many good and faithful men and women who love their fellow man as much, if not more, than some of the sanctimonious hypocrites whose mission is allegely the saving of souls, but whose principal asset, so far as can be observed, is the creation of perjurers, corruptionists, blind tigers, kitchen hells, bootleggers, blind pigs, and a host of similar undesirables.

Projectiles, bodies thrown forward by force for any purpose. In a restricted sense the term includes only the large objects thrown from ordnance by means of explosive substances. The first projectiles were simply stones, arrows, and darts which were discharged from the ballista, the bow, or the catapult. When gunpowder came into use in the fourteenth century guns rapidly took the place of the earlier weapons, and arrows and darts were no longer in general use. Stones, however, were retained, and pebbles were used until the fifteenth century, when iron became the leading material used for projectiles. From cast iron were made solid, round shot, which were often heated before the gun was loaded and directed against fortifications. Case shot consisting of a number of balls held together in some way, soon followed. In the form first used they were called grapeshot, and were made of several spherical shot arranged in tiers around a central rod and held together by disks at each end and several rings. Canister consisted of a number of balls in a tin case. Common shells were at first made of two hemispheres fastened together, filled with gunpowder, and equipped with a fuse. Shrapnel were cylindrical shells filled with projectiles, and an explosive which was ignited by a fuse thus scattering the contents.

Projecting Machines a general term applied to apparatus for exhibiting enlarged images of objects or scenes upon a screen more or less distant, so as to render them visible to a number of persons in a darkened room, hall or theater. The most familiar examples of such machines are the magic lantern, the stereopticon, and the moving-picture projecting apparatus. Spotlights and searchlights may also be called projecting machines, but these are confined to the projection of light rays to a distance.

Magic Lantern. The name magic lantern is usually given to the smaller optical instruments or toys used for projection purposes, while the term stereopticon, or projection lantern, is properly applied to the larger or more practical instruments used to illustrate lectures, for various scientific demonstrations, and in connection with moving-picture apparatus for public exhibitions. But the simplest magic lantern

contains the germ of the scientific principle utilized in all the more highly developed machines. Long regarded merely as an optical toy, its practical value was finally discovered and it has now become a useful and instructive instrument in applied science.

Early history of the magic lantern is veiled in obscurity; in old Dutch and Latin books, mention is made at times of such an instrument. A definition in an old Latin dictionary calls it "a small optical instrument which, by a gloomy light, shows monsters so hideous that those not in the secret believed them to be performed by magic art." Another old book speaks of "a majick lanthorn which, when used in an obscure place, produces many hideous shapes." It is therefore probable that the method of producing images by an apparatus similar to that of the magic lantern was early discovered, and was used by men who claimed occult powers in producing appearances which have been deemed supernatural by the ignorant of all ages. It is said that Friar Roger Bacon invented and used a magic lantern in 1252. This most probably was some arrangement of concave mirrors, with which the ancients were familiar. A description of a magic lantern used at the Jesuit College in Rome is given in a Latin book published by Kircher in 1640; and in 1640 a workable magic lantern was exhibited at Lyons by Walgensten, a Danish scientist, which was in all essential particulars like the modern device, but without a condensing lens. It had a naked light with a concave reflector behind it, the object was placed in the proper inverted position before the objective, and the image appeared erect and enlarged upon the screen. Walgensten used slides with many pictures painted on them in transparent colors, like those of the toy machines of the present day.

In construction the magic lantern is very simple. It consists essentially of three principal parts; namely, (1) the source of light; (2) the condensers; (3) a system of magnifying lenses.

The sources of light that have been used are candles, vegetable and animal oils, petroleum and its products including kerosene, and the oxy-calcium, acetylene, oxy-hydrogen, magnesium and electric lights. Sunlight, used with a heliostat, or mirror to concentrate the light rays upon the condensers, also may be used for daylight exhibitions.

The condensers are single lenses of large diameter and long focus, placed near the light so as to subtend as large an angle as possible. Their function is to collect the maximum amount of light from the source employed, and transmit it through the picture. To reduce the focal length, two or more lenses must be used to produce a good, convergent bundle of rays. Condensing lenses have been much improved in late years, and the better class of lanterns, or stereopticons, are now provided with such combinations of lenses as to produce convergent or parallel rays, making a small pencil of light when required for special purposes; also enabling pictures to be projected to a much greater distance than formerly.

The third essential part of the magic lantern is the objective, or means of producing a magnified image of the picture or object. Its first function is to produce a magnified inverted image, as the lantern slide is inserted upside down, between the condensers and the objective. In the cheap form of lantern, the objective is simply a small double-convex lens of short focus. In more scientific apparatus, objective lenses of high cost, corrected for spherical and chromatic aberration, are often used, and sharp, well-defined pictures are the result. A common combination for a stereopticon objective consists of four lenses, the back and front, each of two lenses; the front lenses are cemented together and look like one lens; the back lenses are separated by a ring.

The size of the image produced by the objective depends upon its focal length and the distance of the lantern from the screen. The greater the distance the larger the picture and less the light, the latter diminishing inversely as the square of the distance. Thus a picture 10 feet in diameter will be twice as well illuminated as one 14 feet, and a 20-foot picture will have diminished four times in intensity. The light used must always be of sufficient power to give

good clear pictures at the distance of the lantern from the screen, and the choice of distance depends upon circumstances, location, and convenience. For long distances it is necessary to use large and long focus lenses; when the lantern is near the screen, short focus objectives are used.

For public exhibition purposes, the electric arc light and the incandescent light have now practically supplanted the oxy-hydrogen light which was used by lecturers and other magic lantern and stereopticon exhibitors for many years. Arc lamps are supplied with the modern projecting machines, also rheostats for the conversion of current when necessary. Satisfactory projection of motion pictures requires the intensity of the electric light. The oxy-hydrogen light is one in which oxygen and hydrogen gases (the latter ordinary illuminating gas) mix under pressure at the tip of a blowpipe device, and form a flame that when lighted and thrown upon a small lime cylinder gives a brilliant light which is reflected and condensed behind the object or picture to be projected. Supplies of gas were formerly carried by exhibitors in metal cylinders containing 25 or 50 cubic feet each. The cylinders were painted red and black, for oxygen and hydrogen respectively; but this source of light is now used only where electric light is not available.

The first forms of magic lantern were large and cumbersome, but in the last half of the nineteenth century single lanterns were reduced to a size convenient for hand carriage; and with the aid of improved slide-carriers such lanterns were widely used for educational purposes. For public exhibition purposes, however, the stereopticon has long been preferred.

STEREOPTICON. The stereopticon, or dissolving lantern, is an improved form of magic lantern, consisting essentially of two complete lanterns matched and connected. The object of the reduplication is to permit the pictures shown to pass from one to the next by a sort of dissolving effect which is secured by alternate use of the two sets of lenses. This at the same time avoids the delay and the unpleasant sliding of the pictures across the screen in view of the audience, which is unavoidable when the simple magic lantern is used. The two lanterns may be placed either one above the other or side by side. Some forms of stereopticon are made with three lanterns, such a lantern being called a triplexicon. The lanterns in the stereopticon are so arranged that the illuminated circles shall exactly register, or coincide, on the screen. It was at first supposed that a stereoscopic effect could be produced in this way, and it was held a great secret, until the fact became known that only one picture was used at a time, making it impossible to yield such an effect. Hence the name stereopticon is really a misnomer, and it should be called a dissolving lantern. This form of projecting machine is now used at all first-class exhibitions.

MOVING PICTURE MACHINES. Projecting machines for moving pictures have an optical arrangement essentially the same as that of the magic lantern for the projection of ordinary slides; but as the aperture of the moving-picture machine is much smaller than the slide, the moving film must be arranged farther away from the condenser in order to intercept the same quantity of light.

The moving-picture machine, as furnished to exhibitors, consists of a stand and baseboard, arc or incandescent lamp, lamphouse, condenser, the moving-picture head, aperture plate, objective, shutter, film magazines, and mechanism for moving the film; also an extra film reel and a rewinder. See MOVING PICTURES.

The arc lamp usually supplied with moving-picture outfits is of the hand-feed type with inclined carbons. Handles for feeding the carbons and up-and-down adjustments project backward so that they may be manipulated without opening the lamphouse. The lamp is inclosed by a metal house to protect the operator from the intense light and protect the arc from air currents. A small window of darkened glass, or some other means, is provided to enable the operator to observe the arc, and the lamphouse is well ventilated to enable the heat, but no light, to escape.

In front of the lamphouse is the condenser, usually in a box which is fastened to the lamphouse and moves with it; and

in front of the condenser there often is the lantern-slide carrier for use with the magic lantern which is usually employed in connection with moving pictures. The condenser is provided with two plano-convex lenses; its function is the same as in the magic lantern. Some makers provide a stationary slide-carrier opposite the magic lantern objective, so that the whole face of the objective is free when it is opposite the moving-picture objective; and this is preferable to fastening the slide-carrier to the lamphouse.

All of the elements of the moving picture machine except the arrangement for lighting are contained in what is called the moving picture head. This holds the obpective and contains the aperture plate and the film moving mechanism. The objective is similar in design to a magic lantern objective, but has a shorter focus, with lenses of 1¾ to 2½ inches in diameter. The objective forms the image of the film picture on the screen, and the larger objectives give with less trouble a screen image without shadows.

From an optical standpoint, the aperture plate, which serves as a frame for the picture on the film, is the most important part of the moving picture head. The standard aperture plate has an opening 29-32 inches wide by 87-128 inches high, with rounded corners. When the picture is in focus on the screen, the edges of the aperture plate are also in focus at the same time.

The film mechanism consists of the proper gears and sprocket wheels for moving the film and for turning the shutter which cuts off the light during the time when the film is in motion. The mechanism is complex and differs in different makes of machines. The shutter is located either just beyond the aperture plate, and hence before the objective, or just beyond the objective. When located between the aperture plate and the objective, it is called an inside shutter, and when beyond the objective it is called an outside shutter.

The film magazines are large sheet-iron boxes which hold the film reels. They are big enough to hold the standard 10-inch reels, and often large enough to hold the larger reels of 12-inch diameter. They are fitted with fire-traps to prevent any fire getting into the magazine if the film should start to burn. Operating rooms of fireproof construction are usually required by municipal ordinance in theaters and halls where moving picture machines are in constant use.

In projecting the film picture, light from the arc is collected by the condenser so as to illuminate the film. This illumination must be very intense and at the same time must be evenly distributed over the entire area of the film. Only one picture of the film is really seen at a time, and this is just in front of the opening of the aperture plate. It is this short section of film which must be evenly illuminated and projected upon the screen. Beyond the film is the objective, which must be of good quality to give sharpness to the screen picture, and must also be of the right focal length, as this determines the size of the screen picture for a given screen distance. When a film is passing through the machine, the rule for its position is the same as with the lantern slides, that is, the picture should appear correct to the operator when he looks through it toward the screen, but it must be upside down. The film-moving mechanism, consisting of three sprocket wheels, operated by a hand-crank, or an electric motor, pass the film downward in front of the aperture by a series of jerks, usually undistinguishable on the screen, the shutter cutting off the light momentarily while the film is in motion and thus preventing any blurring due to the movement of the film.

In operating the moving-picture machine, the crank is turned in a right-hand or clockwise direction at such a speed that the film passes at a standard rate of 16 pictures per second. The action in the scene presented serves as a guide for the proper speed, as some films are improved by being shown at a slower or faster rate. As the machine starts, an automatic fire shutter in the lamphouse opens and allows the light to fall upon the film. If the picture is not at the right height on the screen, it can be "framed up" by moving a lever which raises or lowers the mechanism and film.

Prometheus, prō-mē′the-us, in Greek mythology, one of the Titans, the giver of

fire to man, and, according to some accounts, the creator of man. His name signifies forethought. He turned against Cronus and the Titans in their great battle with Zeus, enabling the latter to conquer. Zeus now began to arrange the universe to suit himself. First he separated the land from the sea. Then he made the mountains, valleys, and plains, the rivers, lakes, and forests. Here he placed living birds, beasts, and fish, but he was still unsatisfied. Then Prometheus came to his aid again, and, kneading some earth and water together, created man. Later, so the legend runs, he became dissatisfied with the plans of Zeus for the destruction of mortals and the creation of a new race. Prometheus alone of the gods was kind to man.

Promissory Note, an unconditional promise in writing to pay on or before a fixed date a stated sum of money to a person named. The following form is simple and correct:

$240.

MINNEAPOLIS, MINN., Jan. 1, 1923,

Sixty days after date, for value received, I promise to pay to the order of Welles Brothers and Company the sum of two hundred forty and no/100 dollars, with interest at six per cent.

JOHN DOE.

Some of the business laws that apply to promissory notes are in brief:

The maker of a note that is lost or stolen is not released from payment if the amount and consideration can be proven.

Notes bear interest only when so stated.

Demand notes are payable on presentation, without grace, and bear legal interest after a demand has been made, if not so written. An endorser on a demand note is holden only for a limited time, variable in different states.

A negotiable note must be made payable either to bearer, or be properly endorsed by the person to whose order it is made. If the endorser wishes to avoid responsibility, he can endorse "without recourse."

A joint note is one signed by two or more persons, who can each become liable for the whole amount.

No grace is allowed in the majority of states on time notes after the time for payment expires. If not paid when due, the endorser, if any, should be legally notified to be holden.

Notes falling due on Sunday, or on a legal holiday, must be paid the day following as a rule.

A note made on a Sunday is void, also one dated ahead of its issue. It may be dated back at pleasure.

Altering a note in any manner, by the holder, makes it void.

A note by a minor is void in some states, and in others it is voidable on judicial decision.

Notes obtained by fraud, or given by intoxicated persons, cannot be collected. It is a fraud to conceal a fraud. Signatures made with a lead pencil are good in law. The acts of one partner bind the rest.

An agreement without consideration of value is void. "Value received" is usually written in a note, and should be, but it is not necessary. If not written, it is presumed by the law or may be supplied by proof.

The maker of an "accommodation" bill or note (one for which he had received no consideration), having lent his name or credit for the benefit of the holder, is not bound to the person accommodated, but is bound to all other parties precisely as if there was a good consideration.

No consideration is sufficient in law if it be illegal in its nature.

An indorsee has a right of action against all whose names were on the bill when he received it.

An endorser of a note is exempt from liability if not served with notice of its dishonor within twenty-four hours of its non-payment.

If the letter containing the protest of non-payment be put into the postoffice, any miscarriage does not affect the party giving notice.

Notice of protest may be sent either to the place of business or residence of the party notified.

Prong-horn, or **Prong-buck,** an animal of the western plains, ranging from Dakota to Texas and westward. Hunters and ranchmen call it an antelope. It neither sheds antlers like the deer, nor retains horns like the antelope; but the horny sheath that covers the growth is shed annually. Its horns exhibit a peculiarity of great interest to naturalists. The new covering of the horn is very evidently composed of gluey strands of hair which later harden into ordinary horn. In a scientific classification, the prong-horn occupies an intermediate position between the deer and the antelope. The prong-horn is now becoming scarce but it was at one time an important game animal. It is an inhabitant of the plains. It requires harsh, wiry pasturage. It will not rear young in captivity. Large specimens measure thirty-seven inches shoulder height. See DEER; ANTELOPE.

Proofreading, the correcting on a proof sheet of set type of the errors and oversights of the compositor, with an attempt to make the printed sheet a copy of the author's manuscript. However, the duty of a reader includes more than this, for he must detect inconsistencies, such as frequently arise in spelling and punctuation,

and also verify dates, names, and quotations. The proofreader must direct his attention to ready detection of wrongly placed letters, bad spacing, defective punctuation, and capitalization. Also, he must guard against mechanical defects of the work and direct the numbering of pages, the arrangement of chapters, notes, titles, etc. He makes use of an established set of signs and indicates the necessary corrections on the margin nearest the error. Two proofs are generally taken, and when the work to be printed is of a peculiarly difficult nature more are drawn. The author usually corrects the second proof for himself. After the galley proofs have been returned to the compositor and corrected for the second time, nothing ordinarily remains but the revision, which consists of detecting any oversights of the compositor in making corrections from the last proof. Proofreaders must work with speed and accuracy; they must be familiar with typography in general; and they must possess wide and general knowledge. The task is never an easy one; it is often monotonous, and it is far more complex than the average person imagines.

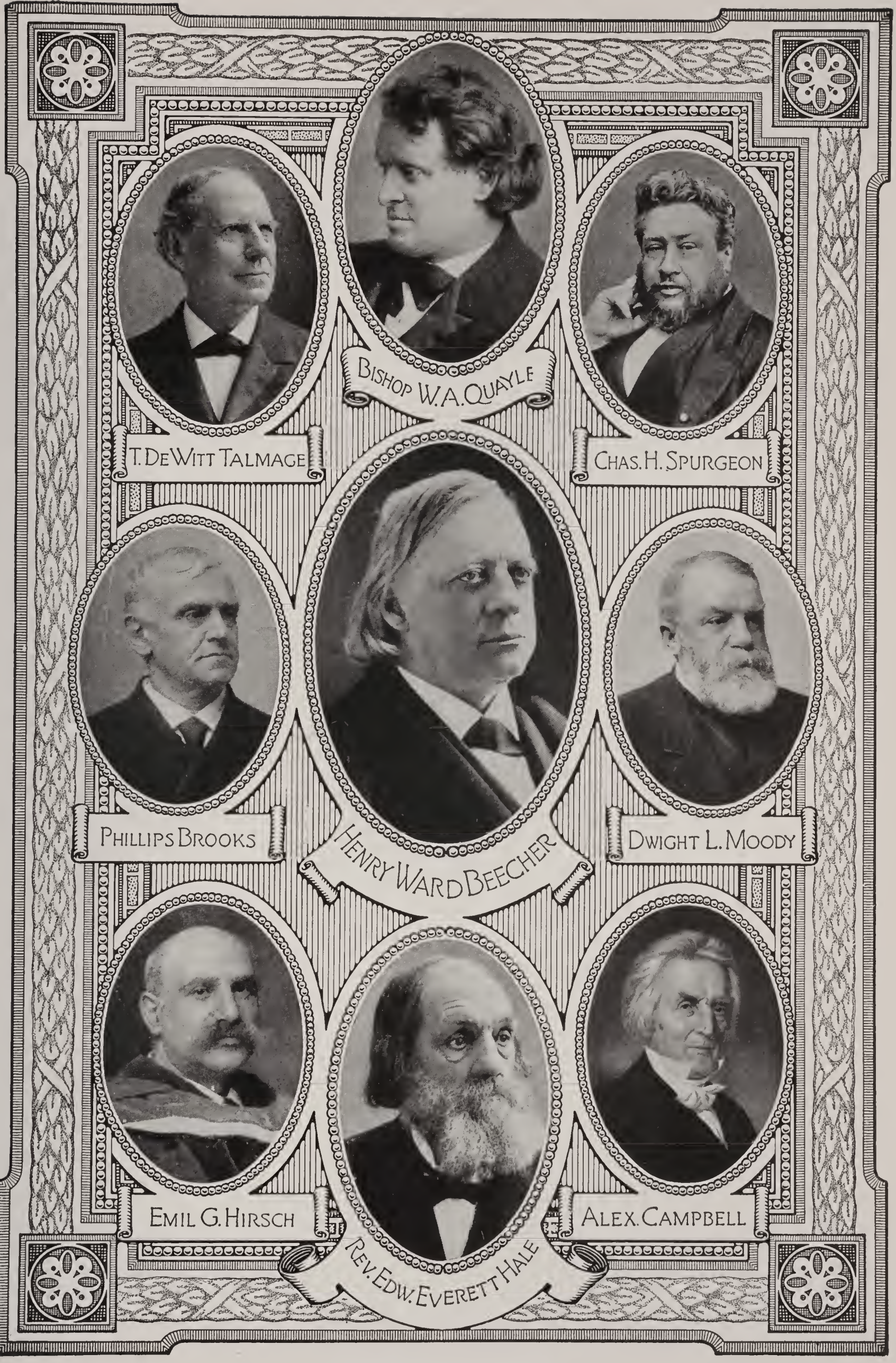
Proportion, in mathematics, an equality of ratios. In the series the first and last terms are called the extremes; the second and third are called the means. The four quantities are in proportion when the ratio of the first is to the second as the ratio of the third is to the fourth. Thus, a is to b as c is to d, if the ratios of a to b and c to d bear the same mathematical relation to each other. This equality can be written in either of the two ways, a/b=c/d, or a:b::c:d. Numbers varying directly as each other are simply or directly proportional. When one increases and the other decreases, that is, when they vary inversely as each other, they are inversely proportional. The distinction between arithmetical and geometrical proportion corresponds to the distinction made in progression. See PROGRESSION.

Protection, in political economy, the policy of encouraging home industries. A government may afford encouragement by paying a bounty on home productions, by paying an export bounty on shipments abroad, or by the easier and more usual method of imposing a tariff on importations of foreign goods. A tariff imposed for this purpose is known as a protective tariff. Protection is the opposite of free trade. It should be noted also that a protective tariff is not a revenue tariff; for the more completely a tariff protects, that is to say, the more completely a tariff shuts out foreign goods and gives the market over to home manufactures, the more decidedly it cuts off the collection of custom duties. If we raise our own fibers, and produce our own dyes, and weave our own textiles, and make up our own cloth into garments, all under protection that bars competition, it is evident that no clothing will come through our custom houses to pay revenue into the national treasury. The greater the degree of protection a tariff affords, the less it contributes to the national revenue.

The question of protection *versus* free trade is one of the big problems of the world and it is not settled. Under a policy of protection, carried to one extreme, each nation of the world would bar all products that could be produced at home or for which a domestic substitute could be found. Free trade carried out in full accords each person in the world the privilege of carrying, buying, and selling, the world over, without let or hindrance, save submission to lawful and necessary police and sanitary regulations. Free trade does not imply the admission of property without proper proof of ownership, nor does free trade imply admission without sanitary inspection. The United States is today the foremost protective nation; the United Kingdom is the representative of free trade.

Several topics may be noted in connection with a general discussion of protection:

1. NATIONAL INDEPENDENCE. This argument comes to the fore in time of war. During the Revolutionary War the patriots were hard pressed by the fact that we had been dependent on the mother country for manufactures of nearly every description. We had no way of making guns, no mills for the manufacture of paper, or powder, or cloth. The wayside blacksmith shop and the household loom were the dependence of the youngest nation in the world fighting with the most powerful nation,—the greatest military power on the globe. In



EMINENT DIVINES

this emergency the Continental Congress was obliged to turn to France for muskets and ammunition. Hamilton, the foremost exponent of a strong central government, urged the principle of protection as a political—a national—necessity. The War of 1812 also found the Union uncomfortably dependent on European sources for manufactures. During the Civil War the Confederate States were at a serious disadvantage because the manufactures of the nation were chiefly in New England. The federal government was in position to place orders for ammunition, accouterments, tents, blankets, boots and shoes, underclothing, and uniforms, while, aside from the contents of Federal arsenals, the Confederate authorities were in the predicament of the Continental Congress. This argument is an argument in favor of ultimate peace rather than an argument for protection.

2. Infant Industries. The reasonable protectionist is not in favor of imposing a protective tariff on articles that we are not likely to produce at home. No sane legislator would call a prohibitive tariff on diamonds a protective tariff. A tariff might, indeed, keep diamonds out of this country, but it would not, in the present state of science, stimulate the production of American diamonds. Diamond mines may be opened one day in this country, or methods of making artificial diamonds may some day become practical, but for the present there is no object in protecting American diamond mines and factories that have no existence. Diamond cutting, on the contrary, can be carried on in this country. Under the influence of a protective, though not a prohibitive, tariff on cut diamonds, the business of cutting has taken root in New York City and elsewhere. It is what may be called an infant industry. It is quite conceivable that under continued protection American workmen may develop skill, methods, and machinery that will enable them to control a large part of the cutting and polishing business and even sell cut diamonds in the European markets in competition with the Old World centers of the diamond-cutting industry. When that day comes, if ever, the American business of diamond cutting will no longer be an infant industry. Most Americans are in favor of protecting promising infant industries. Many of our manufactures have passed the stage of infant industries. The Steel Trust, still protected by an American tariff, is able to produce steel rails as cheaply as any other concern in the world. Our protected steel bridge builders are able to compete successfully with European concerns for bridge work in Africa. Certain American industrial interests, once protected as infant industries, are now charging the American people, their protector, higher prices than they are obtaining abroad. Robert Ingersoll summed up the situation once by saying that he was in favor of protecting an infant industry, but that, when the infant got up in its cradle and began to pound him over the head, he thought it time to withdraw protection.

3. Home Markets. This was Henry Clay's pet argument. Protected manufactures mean factories at home and home markets for agricultural products. The gist of this argument is not that the demand for the farmer's wheat is greater, but that the demand is next door instead of on the other side of the Atlantic. It is argued with justice that, whether a farmer have a dozen eggs or a load of steers to sell, it is advantageous to have the consumer near by. The other side of the argument is the consideration of whether the farmer, in buying protected and therefore high-priced goods, pays so much for them that his advantage is lost. Of late years it is noticeable that the agent of the manufacturers who takes the floor in Congressional debate is the one who sees most clearly the enormous benefits derived by the farmer. And yet the argument is not to be scorned. Bismarck and his successors during the period 1879-1903 made much of the agrarian—the agricultural—argument, and launched Germany on a course of protected manufacturing.

4. Pauper Labor. This is a new argument. In the early days of American protection the principle of high tariff was urged on the score that wages were so high in this country that manufacturers could not compete with cheap European labor. The argument now put forth by the Congressional attorneys of the industrial concerns is that, even though protection may not be required on the ground of infant

industries, it is now necessary for the sake of American wage earners; that without protection American wages must fall to the European level; and American labor be pauperized—reduced to poverty. As a matter of fact, the exclusion of children from European factories and the corresponding increase in wages paid by European employers has narrowed the gap between wages on the two sides of the Atlantic. More than this, the increased cost of living has reduced the actual American factory wage. The claim that a protective tariff is required to keep ahead of pauper labor requires careful examination. The argument that the level of American wages should be kept above that of Europe seems just, but the application of the principle should not be left to the manufacturer. The extent to which machinery has supplemented human labor should be taken into account. The American people should not be required to pay dividends on watered stock on the score of maintaining wages.

5. Vested Interests. Infant industries become adult industries, but the owners become so accustomed to protection that they begin to view it as a vested right and are unwilling to part with .infant protection. They spend money to elect Congressmen to continue and to increase protection no longer needed. Their advocates in the political arena and in the halls of Congress are not inaptly termed "stand-patters." They are of the type found in the English House of Lords—defenders of privileges, not advocates of the people.

6. Monopoly. One of the most impressive arguments advanced by the American advocate of free trade is the fact that under protection a number of monopolies have grown up. Coal, sugar, petroleum, steel, copper, reapers, and numerous staple articles are controlled beyond doubt. It goes without question that the protection afforded during the infant stage enabled these monopolies to get on their feet. It is undisputed that these industries no longer need protection. If the American people had not fallen into the habit or the snare of electing a governing body that intrenches itself within the defenses of Washington and declares its independence biennially, short work could be made of protection for monopoly. If the tariff laws could be reached by a referendum, short work would be made of certain clauses. Yet, after all, it is doubtful whether protection is an important factor in the upbuilding of monopoly. Economy of production and reduction of expense in selling tend to create monopolies. Whether we regard monopoly as a monster of greed and rapacity, or whether we regard it as a triumph of the inventive mind, it is unlikely that a reign of free trade from pole to pole would ever lead back to the carting of oil to the seaboard in teamsters' wagons in place of the monopolistic oil pipe that now runs from Oklahoma to the harbor of New York City.

In 1860 Richard Cobden, the British apostle of free trade, was so much encouraged by the successful negotiation of commercial treaties with France and other countries that he exclaimed: "You might as well tell me the sun will not rise tomorrow as tell me that foreign nations will not adopt free trade in less than ten years from now." Nevertheless in 1910 it may be said that, on the whole, protection has gained ground, and that not only a greater number of articles of commerce are protected, but the "banner of protection" waves over a vastly greater extent of territory than it did in Cobden's day. See Tariff.

Proteids, or **Albumenoids.** See Albumins; Proteins.

Proteins, in the study of food, a large class of compounds containing nitrogen. According to Snyder the proteins as a class contain "about sixteen per cent of nitrogen, fifty-two per cent of carbon, from six to seven per cent of hydrogen, and less than two per cent of sulphur." Protoplasm is composed mainly of protein. A food supplying nitrogenous elements may be called a proteid. Peas, beans, the gluten of wheat and other cereals, milk, lean meat, eggs, and cheese supply nitrogen. Proteins are found in the fluids of the body, as the blood, chyme, chyle, and the digestive fluids. Starch, sugar, and fat are valuable foods; but proteins are needed to build muscle and to make good the wear and tear of the body. The food of a working man should be rich in proteins.

Protestant. See Reformation; Augsburg; Luther.

Protoplasm. See CELL.

Protozoön, prō-tō-zō′ŏn, plural protozoa, a minute animal. The protozoa are simple in structure and difficult to distinguish from the lowest plants or bacteria. Like bacteria, they multiply usually by the division of the parent into new animals, or by the production of a sac full of spores. Many diseases of animals and of the human race are now attributed with reasonable certainty to colonies of protozoa living on the red corpuscles of the blood. Such diseases are infectious. Malaria, Texas cattle fever, and the tsetse fly fever are of this sort. Smallpox, yellow fever, and other epidemics are due to microbes parasitic in the blood. See BACTERIUM; DISEASE; YELLOW FEVER.

Proudhon, proo-don′, **Pierre Joseph** (1809-1865), a French writer. He was born in Besançon and died at Paris. His father was a cooper. He attended the university of his native place for a time and learned the business of printing. He was an ingenious, studious man. In 1838 he contributed a treatise on general grammar to the academy of Besançon, for which he received a grant of $300 for three years. He then turned his attention to political economy. He is known as the founder of philosophical anarchy. In 1840 he published his famous work, *What Is Property?* His own answer was, "It is theft." His political writings gave offense to the French government. He was fined frequently. Anarchistic papers started by him were suppressed. More than once he found it desirable to leave the country. According to his theory all increase in wealth is due to labor and should be divided among the laborers. Profits should be distributed in the form of wages. Individual wealth, resulting from merchandising, manufacturing, and the like, should be rendered impossible. See SOCIALISM.

Provence, prō-vŏns′, an old province of southeastern France. It comprised the region about the mouth of the Rhone and the region eastward as far as the Maritime Alps. It was an important province of the Roman Empire. Roads, baths, theaters, triumphal arches, and other remains indicate that it was the seat of much wealth. It was the seat also of an early western civilization. Arles and Marseilles were important cities. The customs and language of the people seem to have been inherited from the Romans, but they were not Italian, neither were they French. Even to this day, ancient Provence seems like a country sandwiched in between France and Italy. During the twelfth and thirteenth centuries Provence was noted for its troubadours or minstrels. They shared the religious enthusiasm of the period of the Crusades, but were developed by chivalry. It was the custom of the time for a knight to devote his lance to the service of some lady, quite usually the wife of his superior. His feats at arms were won in her name. His trophies of war he laid at her feet. Conversation was stilted and artificial, and, we may well believe, without sincerity. The troubadours went from castle hall to castle hall with their harps singing the adventures of knights and the trials they underwent, all for the sake of their lady loves. Adventurous love for lady was the one theme of the troubadours, on which they literally "harped" for two centuries. As the singing passed away before the invention of printing, few of their lays have been preserved. The troubadours belonged to the period of knight-errantry, to a time of castles, lords, and ladies. They sang of gay hunting parties, pennons, feats of arms, and stately dames. They dressed in gay apparel and were followers of the aristocratic few. They knew little and cared less about the joys and sorrows of the common people.

Proverb, a short, pithy, popular saying having the flavor of antiquity.

A proverb is much light condensed in one flash. —Simmons.

A proverb is the wit of one man and the wisdom of many.—John Russell.

. . Jewels five words long
That on the stretched forefinger of all time
Sparkle forever. —Tennyson.

Short sentences drawn from long experience.—Cervantes.

The ingredients of a good proverb are sense, shortness, and salt.—Howell.

Well known and well used dicta framed in a sort of out-of-the-way form and fashion.—Erasmus.

Every nation has its proverbs. English proverbs are from varied sources. In the

following examples the source is given when possible:

What is bred in the bone won't out of the flesh. —Dutch.

A bad penny always comes back.

A bad beginning makes a good ending.—German.

A cocoanut-shell full of water is an ocean to an ant.

It takes two to make a bargain.

If wishes were horses, beggars would ride.

Hunger is the best sauce.—French.

Little pitchers have long ears.

Jupiter himself cannot please everybody.—Latin.

A bird in the hand is worth two in the bush.—Cervantes.

It is hard for an empty bag to stand upright. —Benjamin Franklin.

He that toucheth pitch shall be defiled thereby. —Bible.

The pen is mightier than the sword.—Bulwer.

Too swift arrives as tardy as too slow.

Providence, the capital and largest city of Rhode Island, is the second city of New England in population. It is situated at the head of a tidal arm of Narragansett Bay, called Providence River, about thirty-five miles from the ocean and forty miles southwest of Boston. The first settlers were Roger Williams and his few associates who had been expelled from the Massachusetts Bay Colony. They arrived June, 1636. A year later a grant of land was obtained from the Narragansett Indians. The settlement grew slowly, sharing the vicissitudes of other New England towns. It took a prominent part in the opening events of the Revolutionary War. The British schooner, *Gaspee,* was destroyed here in 1772.

The harbor is a magnificent sheet of water. In the early third of the nineteenth century Providence was a seaport town of importance. It is now the port of the Fabre line of steamships (Italian), which carry passengers, as well as freight. Pacific steamers from Vancouver with lumber, and steamers from Nova Scotia, Tampico and Port Lobos, Mexico, arrive here weekly and sometimes twice a week.

The city is an industrial center and a great oil distributing center for New England. The manufactures are not only varied but of enormous extent. Coal and iron, easily obtained, have led to the building up of a business in the manufacture of iron and steel goods. In this respect, the city is a rival almost of Pittsburgh. Locomotives, Corliss engines, boilers and stoves are the larger articles manufactured.

Cables, insulated wire and rubber and leather belting are made on an extensive scale. Providence leads the Union, if not the world, in the manufacture of files and rasps, screws and fine tools. Providence is also one of the great centers of cotton spinning. A single company operates over half a million spindles. The city is noted for its woolens. It is the chief city in the Union in the making of jewelry and silverware. There are between 200 and 300 establishments engaged in electroplating, gilding, engraving, coloring, diemaking, etc. It is said that the treatment of the mere sweepings of the factories in which precious metals are used, an item formerly neglected, yields several thousand dollars annually. Forty-five thousand people earn wages to the amount of $20,000,000 in connection with the various factories. The total annual value of manufactured goods is not far from $100,000,000. As might be expected, the city is the center of much wealth. The savings banks contain deposits of about $75,000,000. The population in 1920 was 237,595.

The public library was established in 1871 and contains 261,750 volumes. The Providence Athenaeum, one of the earliest libraries in America, dates from 1753. It now contains 100,000 books. Brown University, with 1,250 men students and 420 women students in the women's colleges, and an endowment of $7,768,043, is located here. It was chartered in 1765. It is nonsectarian, but has always been under the control of the Baptist denomination. The oldest church in the United States, the First Baptist, founded in 1638, is located here. The present building was erected in 1774.

A complete system of public schools is maintained. The Rhode Island College of Education and the Rhode Island School of Design are located here. The most imposing church building is the Roman Catholic cathedral. The city has twenty-nine parks. The largest, Roger Williams Park, is a

favorite with children. It contains a series of lakes and is adorned by a bronze statue of the founder of the city and commonwealth.

Provo, Utah, the county seat of Utah County, is on the Provo River, 48 miles southeast of Salt Lake City and three miles east of Utah Lake. It is served by the Denver & Rio Grande, and San Pedro, Los Angeles & Salt Lake railroads. Provo has manufactories of woolen goods, flour, tin and iron roofing and a few other commodities, but its chief importance is as a commercial center. The surrounding country is abundantly productive of cereals, sugar beets, lumber and live stock, and a large trade in these is carried on. Immense blast furnaces are (1923) in process of construction.

Features of the city are Brigham Young University, a Federal building, Proctor Academy, a state insane asylum, a Mormon tabernacle, a Carnegie library and several parks. The environs of the city are rich in scenic beauty, Bridal Veil Falls, Utah Lake, Provo Cañon and Mount Timpanogas being particularly attractive. The population increased from 8,925 in 1910 to 10,303 in 1920.

Proxy, the legal appellation of the agency of one person who acts as another's substitute. Though the practice of voting by proxy originated in the British House of Peers and was there used for many years, abuse caused its abolition in 1868, and in all countries voting by proxy is now reserved almost exclusively to business meetings. Thus a group of small stockholders in a corporation may authorize a large stockholder to be their proxy for a number of years, or one man may authorize another to vote for him in any business transaction.

There was a time, after the practice of voting by proxy became well established, when marriage by proxy was not unusual; but in the last one hundred and twenty-five years the right of performing the marriage ceremony in this manner has been little exercised. Even in times past marriage by proxy usually was resorted to only when those desiring marriage lived great distances apart and had no means of traveling to meet each other.

Prud'hon, pru'dôn′, Pierre (1758-1823), an eminent French artist and portrait painter, was born at Cluny. His father was a stone-cutter, and the boy received the rudiments of his education in the monasteries of Cluny. Although he is one of the greatest painters of the classical school, he is really one of the pioneers in romanticism, and in his work is shown the beginnings of many of the later more finished artists.

His early career was hampered to a considerable extent by an unfortunate marriage, and Paris was slow to recognize him. In 1784 he won the Prix de Rome, and later was appointed painter in ordinary by Napoleon.

Much of his later fame and prominence appears to be due to the influence of his friend and pupil Constance Mayer, who was a great inspiration to him in his work. In his prime he painted *The Rape of Psyche, Venus and Adonis,* and *Crime Pursued by Vengeance and Justice.* The latter work earned him a place in the Legion of Honor. Later he was elected to a position in the Institute.

In 1821 Constance Mayer, for whom he is said to have felt great affection, committed suicide, and the great painter deeply mourned her death.

Out of the paroxysm of his grief he painted *The Unfortunate Family,* a colorful but distressing conception which won him further recognition. It is at this time that he began to create religious pieces, including *Crucifixion* and *The Assumption.*

However, he never recovered from the shock of Mademoiselle Mayer's death, and his death two years after hers is directly traceable to that source.

His paintings are noted for their great simplicity, despite the fact that he was a classicist.

Prune, in horticulture, a plum suitable for drying; in commerce, a dried plum. Ordinary plums cannot be dried whole. They will ferment or sour before they dry out sufficiently to keep. Prune plums are not thin fleshed, quite the contrary; but they contain a large amount of sugar and can undergo the same treatment as raisin grapes. France, with an annual output of

70,000,000 pounds, has been the leading country in prune production, but of late California has taken the lead. Oregon, Washington, and Idaho very nearly equal the output of California. Spain, Mediterranean France, and the eastern shore of the Adriatic export prunes in large quantities. The drying of prunes is an interesting operation. The fruit is allowed to ripen until it falls from the tree. It is then passed over grates or large sieves which sift out rubbish and land the fruit in several piles according to size. The prunes are then pricked to allow the escape of moisture; or else they are run on endless aprons through lye to weaken the skins. After that they are placed in wire-bottomed trays and are either evaporated in a drying house by exposure, for from twelve to forty-eight hours according to size, to heat increasing from 120° at the start to 180° at the finish, or they are dried by exposure to the sun for five to twelve days. If drying be over hasty, the fruit will be hard and lacking in flavor. Unless the drying be thorough, the fruit will not keep. Prunes are graded as 30's, 40's, and so on, to 120's and 130's, according to the number in a pound. See PLUM.

Pruning, the removal of parts of trees and shrubs for the purpose of checking growth in one direction and assisting it in another, either to make them more ornamental or to economize energy. Forest trees are pruned in order that the size of the trunk, which is to be used for timber, may be increased. Fruit trees are pruned to admit light and air freely to the blossoms and fruit, to avoid excessive wood growth, and to keep the tree in good bearing condition. In working with fruit trees care must be taken that the proper branches are lopped off, for the fruit-bearing branches vary among the different trees according to their age, some branches bearing fruit or berries on the year of current growth, others in the second or third year. The proper time for pruning is generally in the season of fullest growth when wounds heal most rapidly. For this reason late winter or early spring is the time when pruning is universally done. There are trees, however, whose wounds heal only in resting season. It is rarely beneficial to cut off branches that are large in proportion to the trunk of the tree. When a large cut is made, wax or paint should be used to cover the wound in order to protect the tree from the weather. The practice of pruning was formerly objected to, but it is now generally conceded that the horticulturist who makes discreet use of his pruning knife acts wisely and in accordance with the laws of nature, even though his process is an artificial one. The tall, straight forest trees bear evidence to the fact that in their period of growth the ungainly limbs projecting from the sides fell away and only the fittest survived.

Prussia, a state of the new German Empire or Republic. It was formerly a kingdom, constituting the principal state of the old empire. The king of Prussia was the constitutional head of the empire. Prussia extends from the Baltic to the Rhine, a distance of 700 miles. The greatest breadth from north to south is 470 miles. The region has a total area of 113,852 square miles, and its population in 1919 was 37,075,240, averaging 325 per square mile. The drainage is entirely into the Baltic and the North Sea. The eastern provinces occupy a low, sandy plain less than seven hundred feet above sea level. The southwestern or plateau provinces are more or less hilly and broken. The rougher sections are occupied by the Harz Mountains, the Thuringian Forest, and the mountains that border on the Rhine. Prussia is rich in coal, iron, lead, and copper. There are also supplies of cobalt and nickel, rock salt, petroleum, and peat. Agriculture and manufacturing are the principal industries.

The history of Prussia is bound up with the Hohenzollerns, an adventurous family from the Danube. In 1417 a Hohenzollern was made elector of Brandenburg. A century later the Teutonic knights made Albrecht, another Hohenzollern, grand master of Prussia, then a little province on the eastern Baltic. By marriage, the electors of Brandenburg inherited Prussia. They adopted Protestantism at an early date and acquired importance as leaders of the new faith in northern Germany.

Under the lead of able princes the history of Prussia has been one of constant encroachment on its neighbors. Territory

was acquired from time to time at the expense of Pomerania, Silesia, Poland, Ansbach, Baireuth, Saxony, Rhineland, Schleswig-Holstein, and the Free Cities. Prussia declared itself a kingdom in 1701. In 1850 a constitutional form of government was adopted. Frederick Wilhelm, the great elector, created the first standing army in central Europe. Frederick William I, the second king of Prussia, amassed an immense treasure. This was utilized by Frederick the Great in wars of aggrandizement at the expense of Maria Theresa and other neighbors. At the close of the Napoleonic wars, the "Black Prussians," good fighters, were rewarded for their part by liberal slices of territory.

During the nineteenth century Prussia became the leader of the north German states in their struggle to form a closer federal union. Because Austria opposed any such union as tending to lessen her own influence in Germany, it became the definite policy of Prussian statesmen from 1848 on to exclude Austria from all German affairs. Bismarck more clearly than any other Prussian saw this, and the subsequent history of Prussia is largely the outworking of the "blood and iron" policy of this one man, supported by King William. To this end he reörganized the army, and manipulated the Schleswig-Holstein affair, thus bringing on the Seven Weeks' War with Austria, by which she was permanently excluded. The one thing then necessary was something that would unite the north and south German states in a common cause, and for this Bismarck found his opportunity in the Franco-Prussian War. The people of north and of south Germany were carried away by a common enthusiasm over the victories at Sedan and Metz, and the surrender of Paris. Amid acclamations of a truly national army William was crowned as Emperor, January 18, 1871, and German unity was an accomplished fact.

Prussia has taken a leading part in the support of German Protestantism, the creation of a standing army, in the development of a peasant system of compulsory education, and in the upbuilding of universities. Forestry, scientific agriculture, mining, and the application of machinery to manufacturing have received attention. While naturally the object of envy on the part of smaller states, it may be seen readily that Prussia followed the only practical way of making Germany a great power instead of a mere geographical aggregation of petty states.

Psalms. See DAVID.

Pseudonym, sū′dō-nĭm, a fictitious name taken by an author in order to conceal or veil his identity, known also as "pen name." Such a name is adopted by an author in order to remain unknown or to attract attention. Local political writers are quite given to concealing their identity under such pen names as Observer, Spectator, Tom Noswal, or Farmer Ben. The writer of the famous Junius letters of British politics is not yet known to a certainty. Poor Richard, the almanac writer, was a household name in the colonies.

Charles Dickens signed his earlier efforts Boz. Washington Irving wrote for a time as Jonathan Oldstyle; Lowell concealed himself as Hosea Biglow. Prosaic Mary Ann Evans signed herself George Eliot; Charlotte Brontë wrote at first as Currer Bell. J. G. Holland is almost as well known as Timothy Titcomb as by his real name. Madame Dudevant is unknown except as George Sand. Sara Payson made herself known to readers as Fanny Fern; Mrs. Lippincott, as Grace Greenwood; Mary Abigail Dodge, as Gail Hamilton. Helen Hunt Jackson signed herself H. H.; Harriet Mann wrote her delightful sketches of bird life over the signature of Olive Thorne. After her marriage to W. T. Miller in 1849 she signed her writings Olive Thorne Miller. The real name of Charles Egbert Craddock is Mary Noailles Murfree. Oliver Optic is William T. Adams. Ik Marvel is Donald Grant Mitchell. Benjamin P. Shillaber is unknown to fame except as Mrs. Partington. Samantha Allen or Josiah Allen's Wife is really Marietta Holley. The Mother Goose of juvenile literature is supposed to have been Elizabeth Vergoose. The pen name of Alice French is Octave Thanet. Pansy is that of Mrs. G. R. Alden. Samuel Goodrich is unknown practically save as Peter Parley. Charles F. Browne amused the American public as Artemus Ward; Samuel L. Clemens, as Mark Twain; Henry W. Shaw, as

Josh Billings. D. R. Locke wrote for the papers as Petroleum V. Nasby. Joel Chandler Harris is our delightful Uncle Remus of the rabbit stories. The list may be extended indefinitely.

Psyche, sī′kē, in Greek mythology, a maiden of such wonderful loveliness that she was mistaken for Aphrodite, goddess of love and beauty. Aphrodite was thus neglected and her jealousy aroused. She called upon her son Cupid (Greek, Eros) to punish Psyche by inspiring her with love for some inferior being; but Cupid fell in love with Psyche himself. Meanwhile Psyche's father had consulted an oracle in regard to her marriage and was commanded to take his daughter to the summit of a mountain and there leave her, for the Fates decreed that she was to be the bride of a monster. Knowing that it was useless to rebel, Psyche was left alone on the mountain. Almost before she was conscious of her loneliness Zephyr lifted her gently and bore her to Cupid's palace, where she became his bride. Cupid, however, never visited his wife by daylight and forbade her to make any effort to see his face. Her sisters, jealous of Psyche's good fortune, persuaded her that her husband was in reality a monster. She determined, therefore, to learn the truth. She waited until he was asleep; then, taking a lamp and a sharp knife with which to slay him should he prove a monster, she approached her husband's couch. To her joy she found that she was wedded to the most beautiful of the gods. But in her excitement her hand trembled, and a drop of burning oil fell upon Cupid's face. He sprang up, and seeing what she had done, spread his wings and flew away out of the window without a word. Poor Psyche wandered everywhere seeking her husband. At last she reached the temple of Aphrodite and became her slave. Aphrodite set her all sorts of menial tasks to perform, some of them so difficult as to have been impossible had not Cupid aided her secretly. One day Aphrodite gave her a small box and bade her take it to Persephone in Hades and ask her for a little "beauty," since her own had been used. Psyche knew no way to reach Hades except by death; so she was about to take her own life when she heard a voice which directed her in her mission, but forbade her to look into the box. Overcome by curiosity, however, she peeped, and a deadly vapor put her to sleep, from which Cupid revived her. She was taken to Olympus, where she became immortal.

Psychical Research, Society for, a society organized for the purpose of investigating the validity of spiritism and such other phenomena as cannot be explained on any generally accepted hypothesis. The English Society for Psychical Research was organized in 1882; the American, two years later. In 1890 the American society was incorporated with the British organization. Several European countries have similar societies. Such names as those of Sir Oliver Lodge, William Crookes, Cesare Lombroso, Professor James, W. H. F. Myers, Richard Hodgson, Professor James Hyslop, and those of many other scientists and learned men are found in the membership of these societies, a sufficient guarantee that the phenomena coming within the province of psychical research are no longer to be regarded as wholly due to the fraudulent practices of unscrupulous quacks, but that some of them, at least, are worthy of serious consideration.

The work of the societies includes the study of hypnosis, mesmerism, telepathy, and all forms of influence exerted by one mind over another without communication by means of the senses; of clairvoyance, spiritism, and the claims of all persons said to be "sensitive" or mediumistic; and the investigation of reported apparitions and haunted houses. The aim of the society is, by the application of scientific principles, to arrive at the truth as to the actual occurrence of such phenomena, and, in case they are found to occur, to learn the cause.

Psycho-Analysis. A method of medical practice which aims to treat various nervous and mental diseases by discovering their underlying causes in the mind of the individual. The patient is unconscious of these causes and they may be discovered by analyzing the patient's thoughts and emotions, which is done by study and questioning. The process is complex and in many cases the discovery of the difficulty requires long and patient study.

Psycho-analysis has recently become pop-

ular, because of the multiplicity of nervous disorders to which it can be successfully applied. In this popularity, however, lies danger, for numerous quack psycho-analysts who have little or no knowledge of the true method have proclaimed themselves practitioners.

The term originated with Sigmund Freud of Vienna in 1893.

The working principles of psycho-analysis rest upon the acceptance of the unconscious side of the mental or psychic life, which forms the greater part of any individual life.

"Every mind," says Jastrow, "is stored with vast accumulations of impressions which cannot be consciously commanded but which none the less contribute to the imagery, the ideas, the memories that guide thought." We should naturally regard this unconscious material as reserve material conserved from the past and lying ready for continual passage over into the conscious life to furnish material for thought and action. This subconscious part of the psychic life should be regarded as the storehouse of all past experience and the sum of the feelings and tendencies which constitute individual character. Freud and others entertained the view that the subconscious is constantly seeking and achieving expression as unfulfilled wishes and incomplete repressions. Dreams, because they are the uncensored workings of the mind, are considered one of the best means of discovering the cause of nervous and mental disorders, and Freud considers their interpretation as highly important.

Many cases to which psycho-analysis may be applied occur among hysterical patients. Freud entertains the theory that "hystericals suffer from their memories." Most cases of hallucination, stuttering, hysteria and other manifestations of nervousness can be traced to an experience which caused a severe mental or nervous shock, or to unfulfilled desires, minor conflicts, repressions and antagonisms which produce an abnormal mental strain. When the cause is discovered and brought into consciousness, the patient is encouraged to remove it by mental effort, such as directing his attention to some line of thought or work in which he may become intensely interested.

Psychology, the science of mind or mental phenomena. The immediate purpose of scientific psychology is to classify and interpret the chaos of mental facts and mental manifestations.

1. Methods of Study. This at once brings the psychologist face to face with a serious obstacle for in other sciences the data and materials used are external to the experimenter; they are the common property of all who work in that field, whereas the basis for psychological classification and investigation is the result of introspection. Speaking generally, then, we might have as many psychologies as there are psychologists. The method of experimental introspection, however, as it has been used by the most advanced students on the subject, has reduced what would otherwise be a world of unclassified and opposing facts, to a system that now approaches order and law.

2. Departments or Kinds. Recent studies in psychology have so enormously enlarged its field and decreased its scope and possibilities that it has been found necessary to divide what was once a general field into a series of subdivisions. Analytical psychology, for instance, aims to analyze or resolve mental phenomena into their component elements. Genetic psychology seeks to trace the growth of mind from its beginnings. In the same way, we may distinguish between the qualitative and quantitative standpoints, the former looking toward the *nature* of mental states, the latter toward the *amount* of them. These points of view naturally overlap each other. Again we may distinguish between psychology as a pure science of mind and psychology as a study of mental facts and their corresponding psychological conditions. The latter is generally called physiological psychology.

All of these psychologies are, however, what may be called individual. Against them we may set group, or race psychology, which undertakes to determine the mental activites of a whole people, or class, or social organization. This at once opens an interesting field, for though mental processes must always be individual the productions of men in groups differ, nevertheless, from the activities of a single person.

Lastly, we may distinguish between normal and abnormal psychology. The first,

as its name implies, seeks to determine the laws of action in healthy human beings having control of their mental operations. The second studies the mental states that obtain in cases of defective mentality, ranging all the way from transitory abnormalities to chronic derangements such as insanity.

3. Relation to Physical Conditions. That mental and physical states bear a close relation cannot be doubted, but just what the relation is has not yet been determined. There are those who maintain that all mental processes are paralleled by corresponding physical conditions. The two processes, however, may be carried on without mutual influence or interference. This is called the theory of parallelism. Other authorities take the position that mental processes both determine and are determined by physical states. A joke makes us laugh, a pain makes us irritable. This is called the interaction theory, and so far as its application to actual life is concerned it has many advantages. It is the basis of many forms of mental healing, its validity in those cases having been pushed so far that its supporters claim that not only do mental states influence physical conditions, but they even control them entirely.

4. Phases or Forms of Mental Activity. Activities of the mind fall into three main classifications, *knowing, feeling,* and *willing*. Just what is their relation to each other or which is the most important has not yet been determined. A simple illustration may show how complex an apparently simple action may be. The mind, let us say, comes into the possession of a new idea (knowing). But it arrives at its knowledge through consciously directed attention (willing). The determination to hold the attention fixed, however, was the result of a desire for new knowledge (feeling). Or the attention may have been directed without any special feeling. Holding the mind focused, however, kindled a certain enthusiasm which readily received the new idea.

The simple illustration shows also that even in a simple process all mind activities are present. The act would not be complete without all of them and yet for purposes of study we consider *knowing, feeling,* and *willing,* as though they could take place separately, and generally an act is named from the one which predominates. Thus the result of determinedly holding the mental powers fixed on a certain end is called an act of the will, though the *feeling* may prompt the act and *knowing* be an accompaniment or immediate result of it.

a. Knowing. Ideas which when classified and made usable make a body of knowledge come as a result of the operation of special bodily organs or of reaction of mental activities upon one another. Thus the senses give us our ideas of the external world. We are conscious of sounds by means of our ears; of form, color, size, etc., by means of eyes, and so on. The action of the purely mental powers, on the other hand, result in abstractions, generalizations, and purely intellectual speculations and theories. The basis of an idea is sensation, the action of a physical power in the brain. Consciousness of the sensation results as an idea, interpretation of the idea gives a perception; the common qualities of many ideas result in a notion called conception, and apperception is the relation which we give a new idea in terms of our general notion or conception of the class to which it belongs.

b. Feeling is the emotional element in consciousness. It is the peculiarly personal quality which we bring to all experiences. It is feeling that links us with the outside world and helps us to understand the sorrows, tragedies, the joys and compensations of life. For purposes of minute study feeling is divided into several classes, such, for instance, as sensuous feeling, those arising from the senses, and formal or ideal feelings, those arising from the operation of mental processes. Generally speaking, the duration of a feeling depends upon the intensity and duration of the stimulus.

c. Willing is the mental power on which all purposive action depends. It originates in feeling and results in voluntary attention leading to a definite and predetermined action.

5. General Remarks. The mental powers do not all develop at once or in the same way. The elementary activities, such as sensation, perception, and memory, are strong in children. For this reason the child's early years should supply much material for observation and discrimination in order that he may have a large mass of per-

sonal experiences upon which to base more complex processes later. The mind follows the lines of bodily development and both grow by developing and differentiating the number and character of their operations. Thus what the child knows from memory is the result of a much higher function, reasoning on the part of the mature man; the child's conclusion is often the result of pure feeling, the man judges, analyzes, weighs. The measure of a man is the complexity of his mental processes; and the same is true of a whole people, for the more they can exercise the highest mental powers the farther they are removed from barbarism, and the nearer they are to a state of perfect civilization.

As to its relation to other sciences, it is now generally conceded that psychology occupies something like a central position. It connects equally with the natural sciences such as physiology, pathology, and anatomy on the one hand, and with religion, sociology, and the whole history of civilization on the other.

Psychotherapy, the treatment of disease by the influence of mental conditions upon bodily states. The term is interpreted sometimes to mean the cure of mental disease, but however accurate such a definition may be etymologically, in popular usage psychotherapy is a general term which includes all forms of healing without material means. Physicians as far back as Aesculapius may be quoted to show that such healing is as old as medicine itself. Plato said, "this is the great error of our day, in the treatment of the human body." It is conceded generally by the medical profession that the personality of the physician has much to do with his success, and any successful doctor can tell—if he will—many instances when "ginger-bread pills" or some other innocent means of relieving a patient from some distressing idea has been employed with happy results. There are many who claim that faith cure, and so-called miracles, instances where people have been healed by touching the bones of saints and martyrs, are in reality cases of cure by mental suggestion.

Of the various systems classed under the heading of psychotherapeutics, hypnotism, that is, suggestion while the patient is in the hypnotic state, takes first place, probably, in point of time. Christian Science, The Emmanuel Movement, Metaphysical Healing, Divine Healing, New Thought Cure, are among the designations given to various systems. In all of these the theory is accepted that psychic shocks, various forms of suppressed emotions, and various mental impressions of painful character, may, although relegated to the realm of the subconscious, be the cause of undermining the health. Although theories and methods differ in the various systems it is worthy of note that all agree in seeking to avoid the exercise of the individual will-power of the sufferer, except for the purpose of concentrating the thought on health, happiness, and hope, rather than on pain, disease, fear, and death. The healer seeks to obtain mental and physical relaxation on the part of the patient; then to destroy fear. After that methods differ somewhat.

The results obtained by psychotherapy have been remarkable, and the widespread interest manifested in the subject by all classes has led to the suggestion that a general conference be held in order that some agreement in methods may be decided on. See PSYCHO-ANALYSIS.

Ptarmigan, tär′mĭ-gan, an Arctic grouse. There are several species differing in summer plumage, but all are white as snow in winter. The ptarmigans are smaller than the prairie hen. They are densely feathered to the nails of the toes. They nest from Labrador and Manitoba northward. They live in the barrens, eating seeds and wild fruits. The willow ptarmigan, while ranging for food, often crosses the international line in winter as far south as the center of Minnesota. The ptarmigan is an exceedingly hardy bird, taking refuge in an arctic snowdrift as readily as a seal in the water. The corresponding ptarmigan of Europe is a resident of the northern part of Norway, Lapland, and Siberia. A species is found in the high altitudes of the Rocky Mountains. They nest on the ground and have the habits of prairie chickens. See GROUSE.

Pterodactyl, ter-o-dak′til, a flying reptile. Fossil forms of several species have been found in the Jura limestone of Europe.

The skeleton is made up of the body and legs of a bird, the wings of a bat, the neck of a serpent (only not so long), and a large, long head set with sharp teeth in each jaw. The largest must have sailed through the air like a bat, with a total wing spread of not less than twenty feet. These fossils are intermediate between lizards and birds. They strengthen the argument that birds have been developed from reptiles.

Ptolemies, tŏl′e-mĭz, **The,** a house of Grecian rulers of Egypt. The dynasty was founded by Ptolemy I, a celebrated Macedonian general who, in 323 B. C., took Egypt as his share of the Empire of Alexander the Great. He made Alexandria his capital, and assumed the title of king, 306 B. C. Ptolemy XII was the last of the name; Cleopatra, the last of the family. The dynasty colonized Alexandria with Greeks and made that city for a century or two the center of Greek learning and literature. Greek was thus made the official language of Egypt. See ALEXANDRIA; CLEOPATRA.

Ptolemy, a celebrated astronomer. A native of Egypt. Dates are uncertain, but he is known to have flourished in Alexandria about 139 A. D. He wrote in Greek, the language of learning at that time. He was an eminent writer on geography and mathematics, but in many respects his teachings were far less scientific than the earlier ones they replaced. He is especially noted for his views of the movements of the sun, moon, and stars. According to Ptolemy, the earth is the center of the universe. The sun, moon, and stars are set in crystal globes which turn around the earth daily carrying the heavenly bodies around with them. This theory would be interesting merely as a curiosity, were it not that the so-called "Ptolemaic System" was adopted and held by the authorities of the church as in accordance with the Bible; for Joshua commanded the sun to stand still and it obeyed him. See Joshua x:12, 13, and Habakkuk iii:11. To doubt the Ptolemaic system was to doubt the Bible and scorn the teachings of the church. Ptolemy was an accepted authority until the middle of the fifteenth century, when it gave way to the Copernican. See COPERNICUS; GALILEO.

Ptomaine, tō′mā-ĭn, in medicine, a poisonous substance formed by the decay or fermentation of meat and vegetables. Spoiled sausages, cheese, and fermented canned meats and vegetables sometimes develop a ptomaine poison sufficient to cause death. Chemically, a ptomaine is an alkaloid compound of carbon, hydrogen, and oxygen. There are over 200 kinds. Some may be formed by chemicals. Those which reach the table in food are thought to be bacterial products formed by bacteria in putrescent food. One sort, formed by the bacteria of bad milk, is found in ice cream. The poison of a deadly mushroom is thought to be a ptomaine. The bacteria of lockjaw and typhoid fever produce ptomaine poisoning. "There is no greater duty devolving upon the housewife," says Dr. Wiley, "than the careful study of all the ways in which ptomaine poisoning can occur and to look after the house carefully every day to see that not a ptomaine can enter into anything she eats. I know no higher study than this and it is one that may preserve the health of all dear to her."

Chickens that have hung long in imperfect cold storage are likely to contain colonies of bacteria; fish too long in the market become tainted, that is to say, infested with bacteria; baked beans, if imperfectly canned, canned vegetables into which air and germs have found the way, and a boiled potato left to spoil, are full of bacterial germs. The modern theory is not that these foods contain sufficient poison to kill, but that the germs introduced into the alimentary canal multiply with rapidity in the intestines and produce the ptomaine poison.

Canned goods should be thrown away if the odor is at all suspicious. Fresh vegetables are free from danger. A high degree of heat kills the dangerous bacteria. For this reason it is safest to recook canned beans before serving. Stale fish and sausage may be rendered absolutely harmless by thorough cooking. Hash made of cold potatoes and bits of meat that have stood around should be cooked beyond all question. The cause of frequent ptomaine poisoning in Germany has been assigned to the custom of eating uncooked sausage. The death of the musician, Anton Seidl, at Brighton Beach a few years ago was traced

to a supper of pickled fish eaten uncooked. The fact that, of the party eating the same food, some individuals eat with fatal effect and others escape without harm is explained in part by the presence of the toxin-producing bacteria in colonies. A spoonful of beans or a piece of canned salmon may contain bacteria, and other servings be free from germs.

See POISON; ALKALOIDS.

Public Debts. See DEBTS, NATIONAL.

Public Lands, in North America, lands held by the government to await private ownership. Oddly enough, parks and government reservations—lands reserved for public ownership—are not included ordinarily in a list of public lands. In Australia and other English-speaking countries, public lands are known as crown lands and the transfer of title to private owners is termed alienation.

First and last, the United States government has had the custody and disposal of a vast domain. The first of these lands were acquired through cession by the original thirteen states to the general government of such territory as lay westward from the present limits of these states. New York led the way; Georgia completed the transfer in 1802. In this manner some 488,000 square miles were confided to the government to be held in trust and disposed of for the general good. The acquisition of Florida, Louisiana, the Southwest, Oregon, Alaska, and insular possessions has made the government of the United States the greatest landholder on the globe, the United Kingdom excepted. The rapidity and, we may say, the recklessness with which these lands have passed into private ownership, while entirely characteristic of the American people, will some day become the subject of deep regret. The government has had, first of all, the Indian tribes to reckon with. The chapter of our national history that deals with the extinguishment of Indian titles is not a record of good faith and fair treatment. Not less than 100,000,000 acres have been set aside solemnly as reservations for the natives, but as settlers have crowded in these lands have for the most part been filched from the Indians by civilization and thrown open to settlement.

The first thought of Congress was the sale of lands to pay off Revolutionary debts. Ohio lands were sold in large blocks to syndicates at one dollar per acre, and later at two-thirds of that price. Large sales were made to a New England company and to a New Jersey company. The purchasers sold to settlers, at a profit of course. Cincinnati and other Ohio River towns stand on lands sold to syndicates. In 1796 the price was raised to two dollars an acre, but this figure was so high that it stopped sales. In 1800 the public treasury took in but $443 from the sale of land, and a credit system of one-fourth down and the balance in three years was authorized to increase sales. In 1801 the sales of Ohio lands reached 1,484,047 acres. Credit was abolished in 1820, but it took ten years to clear up the old accounts.

In the meantime sentiment took shape in favor of small sales to actual settlers. The present system of survey was set in operation in 1785. Jefferson favored rectangular surveys, and Monroe suggested the township six miles square and its subdivision into sections and smaller squares of forty acres each. By this simple device, the legal description of the forty acres known as the southeast quarter of the southeast quarter of section twenty-six, of township one hundred-eleven north, range twenty-seven, west of the fifth principal meridian, refers to and can refer to but one tract of land in North America. In 1820 a policy was inaugurated of selling lands in eighty-acre lots for $100 each. By 1840 about 76,000,000 acres had been sold at this price.

During 1837 the first preëmption act was passed and three times amended. Under this act six months' residence and $1.25 or $2.50 per acre, according to distance from a railway, secured title. This act was repealed in 1891. In 1862 the homestead act was passed. This act enabled the actual settler to secure title by five years' continuous residence. By paying preëmption prices the settler could commute or shorten the terms of required residence, at first to six months and later to fourteen months. The homestead law proved the best that has been devised. It drew thousands of families of industrious and desirable citizens from Europe. In addition to sales

and homesteads, the government has given away an enormous acreage. Revolutionary soldiers were allotted lands; 60,000,000 acres were granted to the Mexican War veterans; grants were made to aid in building the Cumberland and other roads, 4,000,000 acres were granted for canals.

The remnant of our public lands, a few hundred millions of acres, is managed by the general land office at Washington and over a hundred local land offices distributed for the convenience of settlers from Florida to Alaska. As a matter of fact, five of them are east of the Mississippi: namely, New Orleans; Duluth; Wausau, Wisconsin; Gainesville, Florida; and Montgomery, Alabama.

There are various methods of obtaining public lands:

1. Homestead lands. Agricultural land. Limit, 160 acres or, in semi-arid sections, 320 acres. Terms, five years' residence. Particulars should be learned from the appropriate local land offices.

2. Town sites. Sold at public auction or afterward at $10 an acre.

3. Mineral lands sold. Prices vary from $2.50 an acre for placer rights to $5 for a mining claim of not to exceed 1,500 by 600 feet.

4. Stone and timber claims. Lands unfit for agriculture sold at $2.50 per acre.

5. Coal lands. Sold at $10 to $20. Limit 160 acres, or 320 acres to a company. The latter, if not less than four persons, may annex a section after not less than $5,000 has been spent in development.

6. Saline lands. At auction and subsequently at $1.25 an acre.

7. Desert lands. Limit 640 acres. Twenty-five cents an acre filing fee and $1 per acre on proving up; conditional upon irrigating within three years.

The land yet offered the public, for we say the public when we mean the individual, is not all of the best. Much of it lacks water.

During the fiscal year ending June 30, 1919, 11,863,672 acres of Indian lands were entered for settlement, of which 8.312,319 acres were patented under the homestead law. The receipts for the year amounted to $2,817,063. There is a large area of public land still unentered; a portion of what remains is suited to agriculture in its natural state, and large areas can be made productive.

The following is a table of vacant public land on July 1, 1922:

State	Acres
Alabama	40,680
Arizona	13,591,840
Arkansas	257,815
California	18,333,659
Colorado	7,951,963
Florida	104,411
Idaho	8,740,721
Kansas	2,944
Louisiana	8,616
Michigan	73,956
Minnesota	254,296
Mississippi	27,847
Montana	5,659,879
Nebraska	33,928
Nevada	52,429,745
New Mexico	16,490,081
North Dakota	93,102
Oklahoma	21,860
Oregon	13,709,102
South Dakota	209,982
Utah	26,791,051
Washington	1,194,891
Wisconsin	4,348
Wyoming	16,859,593
Total	182,886,310

See HOMESTEAD LAW.

Puccini, Giacomo (1858-), one of the most noteworthy of modern Italian composers, was born at Lucca of a family that had produced several skilled musicians. He studied in his native city and at the Milan Conservatory, and in 1884 brought out his *Le Villi*. This won him recognition, but his next work, *Edgar,* failed because of an extremely poor libretto. In 1893 Puccini had his first great success, with *Manon Lescaut*. When *La Boheme* was produced in 1896 it was considered a greater success than *Manon Lescaut*. Between 1900 and 1910 he produced *La Tosca, Madame Butterfly* and *The Girl of the Golden West,* and at the opening of the World War was ready to bring out *La Rondine* and *I Que Zoccoletti*. Puccini is unquestionably the foremost composer of the early twentieth century, outranking all his contempories in inventiveness, dramatic feeling and technique.

Puck. See FAIRY; BROWNIE.

Pueblo is an important mining city in Colorado, on the Arkansas River. Extensive deposits of coal, limestone, and iron ore are found nearby. Other ores, such as silver and copper, are brought to Pueblo smelters from quite a distance. Lead, gold, and zinc are also handled. Thousands of men are engaged in the iron and steel industries alone; Pueblo is called the "Pittsburgh of the West" because of its importance as a smelting city. In all directions from Pueblo are farming and grazing lands. A wide strip running along the river 200 miles east and west of Pueblo is popularly called "The Valley of the Nile." Located in Pueblo are a large public library, the State Fair grounds and buildings, a state asylum for the insane, several hospitals and sanitariums, and the State Mineral Palace and Park. The Mineral Palace contains an interesting collection of all the minerals of the state. The population in 1920 was 42,908.

Pueblos, pwĕb′lōz, a group of North American Indian tribes, so-called from the nature of their homes. The word pueblo is Spanish, meaning village. As applied to the Indians, the name pueblos means, therefore, villagers. There are now twenty-eight villages of these Indians, with a total population of about 10,000. The villages of the Queres are along the Rio Grande and its tributaries in New Mexico. The Zuni villages are in the region of the Zuni Mountains in western New Mexico. The Moquis and others dwell on tributaries of the Colorado in northeastern Arizona. Still other half-Mexicanized villages are found in Texas and in the Mexican province of Chihuahua.

The Pueblos are a settled agricultural people. Each community lives in a single building called a pueblo. The pueblo is a curious structure. It is a large building, built usually of sandstone slabs, although adobe or sun-dried brick are also in use. The building usually surrounds one or more courts. The inner wall is terraced,—story by story. The outer wall may be several stories high and is unbroken save by small apertures which serve to let in light. Viewed from the court within, the building rises by successive steps, each a story in height. Originally, the first story was without doors or windows. Its inhabitants climbed to the roof by means of a ladder and descended through hatchways. The inhabitants of the second story entered through doorways from the flat roof of the first story, those of the third from the roof of the second story, etc. The inmates pulled their ladders up after them in time of danger. The entire edifice contains a great number of small rooms, giving rise to the expression, "many-celled." The Casas Grandas of Chihuahua are thought to have sheltered 4,000 people. All roofs slope a trifle to carry off occasional rain. They consist of well tamped adobe mud, laid on brush and pine or cottonwood beams. With continued usage the mud roof became almost as hard as a piece of pottery. The later pueblos, built by Indians who had learned to use longer beams, contain larger chambers.

Connected with each pueblo, sometimes forming a part of the main building and sometimes in the court apart from it, there is a circular, half-way underground apartment used by the male Indians as a council chamber and sleeping room. A fire is built in the center of it. The smoke escapes by a hole in the top. These apartments were so hot and smoky that the Spanish explorers called them ovens.

The Pueblos are an undersized people, rather well formed. The men are described as having a rich brown complexion; the women as lighter in color, varying from a light brown to olive. Albinos are not uncommon. The hair is of the black, glossy nature peculiar to Indians. The warrior wears his hair in three lengths. He cuts it squarely across his forehead and square again at each side of the face at about the height of the chin. The hair on the back of his head he allows to grow full length. The women cut their front hair at the level of the chin. Although nominally parted in the middle, it hangs unconfined like a curtain over the face and requires to be put aside constantly.

The original clothing of the Pueblos was made of the hides of animals. The modern Pueblos have substituted woolens for the skin garments worn by their ancestors, although in style they still adhere to the blanket, the poncho, and the moccasin.

They are skillful in the manufacture of cotton and woolen blankets, sashes and waist bands, leggings, and the like. They are much given to necklaces and beads, ear-pendants, bracelets, and other ornaments. Among the Zunis there are still men who are excellent silversmiths. They are the most expert native potters in the United States. Their productions compare favorably with the pottery of the Aztecs. They are also skillful basket weavers. The ancient tribes were, no doubt, skillful hunters. At certain seasons of the year the buffalo was formerly abundant in the Rio Grande country. The mountains were full of deer, antelopes, elks, and bears. For religious reasons the Pueblos refuse to eat fish. The country in which they live is so arid that water is regarded as a sacred element. The fish which live in it are objects of veneration not to be eaten for food. Ever since they were first known the Pueblos have been agriculturalists. They conduct the waters of the streams by ditches to irrigate their little fields. When first known their principal crops were corn, squashes, beans, and onions. Wheat, watermelons, muskmelons, grapes, peaches, and other vegetables and fruits have been obtained from the white man and are now cultivated with success.

Our first historical knowledge of these Indians was obtained by the Spaniards. In 1539 they were visited by a Franciscan friar, who brought back a report of the "Seven Cities of Cibola." In the following year Coronado led an expedition into their country by way of Mexico. He had heard of the seven cities, but, what was more to his purpose, had heard that they lay in a land of gold. His expedition was unsuccessful from his point of view. It led, however, to the occupation of the country in the name of Spain, and to the Christianization of the Indians by missionary friars. He reported sixty-six villages and 20,000 warriors. The latter is regarded as an over estimate. In 1680, and again in 1696, the Pueblos revolted and drove the Spanish garrisons out of their country. They were, of course, reconquered and were required to abandon many of their old pueblos. They have also suffered considerably from the Apaches and Navajos.

There are hundreds of old pueblos scattered all over Colorado, New Mexico, and Arizona. Only two of those now occupied are as old as the time of Coronado's expedition. The pueblos occupy a great variety of positions. Some are placed on slight eminences; others are built so as to inclose an entrant angle in a cliff; others, again, built on the top of mesas or small tablelands, have perpendicular sides. One of these, Acoma, by name, is situated sixty miles west of the Rio Grande on the top of a mesa 350 feet high. It is the oldest habitation within the limits of the United States. The only way of getting up to it is by means of steep and dangerous trails. It depends for water on a natural pool in the rocky surface of the mesa. The surface is about 165 acres in extent. The villagers depend for food on crops raised several miles away. There is a tradition that they at one time occupied a still higher elevation in the vicinity, called the "Enchanted Mesa." According to their accounts, it was ascended by a single trail. This was washed away during a terrible storm, leaving a number of their tribe on top unable either to descend or to obtain provisions from below. They, of course, perished. Scientists have found the ruins of a pueblo in the location indicated.

The Pueblos belong, without doubt, to the same stock as the Cliff Dwellers. There is a certain similarity between the two kinds of dwellings. In fact, the one shades off into the other.

See CLIFF DWELLERS; NAVAJO; MOQUI; NEW MEXICO.

Puff-Ball, a species of fungi native to warm or temperate climates and growing on decaying wood or earth rich in organic matter. The wood is penetrated by filaments, which are white and branching, and gather nourishment. The fruit that emerges grows globular in form and is made up of these small filaments which form small winding canals on whose walls are spores which escape when the fruit matures in little dust clouds. From these scattered spores new plants germinate.

Puffin, a bird of the auk family. It is related to the grebe and the loon, and more closely to the murre. There are several species, varying from six and one-half to seventeen inches in length. The puffin has

a huge, triangular, gorgeously colored beak that gives it a look of clownish wisdom. On land it sits up on its short tail in an awkward, solemn fashion. In water it dives with loon-like rapidity in pursuit of fish, on which it feeds. The puffin nests in deep rock crevices, or, failing these, and, in fact, usually, at the end of a burrow excavated in a sand cliff. A single white egg is placed in a rounded depression about three feet from the face of the cliff. Sentinels are placed to notify a nesting colony of the approach of danger. If an arm be thrust into a burrow to take a surprised puffin, it grasps with its bill, like a parrot, and holds on like an owl. The common puffin is found along the shores of the Atlantic from Maine and Scotland northward. The wings are weak; the tail, scanty. The side of the face, breast, and abdomen are white. The rest of the plumage is of a jet black. In size the puffin resembles a small duck. The tufted puffin is found on the Pacific coast. It has black plumage, a white eye and cheek patch, and, in the breeding season, a soft flowing tuft of yellow feathers curving backward from above each eye. The enormous bill is of a bright red and olive green. See AUK.

Pugsley, William (1850-), a Canadian statesman, was born at Sussex, New Brunswick, and educated at the University of New Brunswick. In 1872 he was called to the bar, and in 1885 was elected to the New Brunswick legislature, and was re-elected in 1886 and 1890. For ten years Mr. Pugsley was reported for the provincial supreme court. During 1887-1890 he was speaker of the provincial house of commons, and in the latter year he was appointed solicitor-general. After serving again in the legislature he was chosen premier of his native province, in 1907; but after the close of the legislative session he resigned the premiership and resigned from the government. From 1907 to 1911 Mr. Pugsley was Minister of Public Works for Canada, and after 1907 he served in the Dominion House of Commons.

Puisne (from an Old French word meaning *later born, hence, junior*) is the name applied in England and in many British possessions to associate or inferior justices, to distinguish them from chief or superior justices. In the British Isles the name is rather strictly confined to certain courts, but it is of general application in Canada.

Pulaski, pōō-läs′kē, **Casimir** (1748-1779), a Polish count who served in the American Revolution. Outlawed by Russia for fighting for the liberty of Poland, he went to France, where Franklin induced him to support the colonies against England. He landed at Philadelphia in 1777, and after gallant service at the battle of the Brandywine, was made chief of dragoons with the rank of brigadier-general. The next year he organized Pulaski's Legion and was ordered with it to South Carolina. At the attack on Savannah in 1779, Pulaski was mortally wounded. He died on board the famous *Wasp*.

Pulitzer, Joseph (1847-1911), one of the foremost American newspaper men, was born in Budapest, Hungary. His father was a Jew and his mother a Hungarian. He is one of many poor and ignorant emigrants to the United States who have won fame and fortune. Mr. Pulitzer's early schooling was negligible, and at the age of seventeen he emigrated to America. In the same year he joined the Union army and served until the close of the Civil War. Unable to secure work in New York, Mr. Pulitzer went west. In 1868 he secured a position as reporter on the *Westliche Post,* a German Republican newspaper in St. Louis. He was so far successful that in a little time he became managing editor and part owner of the paper. Taking a very active interest in politics, he soon became influential among German voters, and in 1872 was influential in nominating Horace Greely for the Presidency. Mr. Pulitzer had studied law, and was admitted to the Missouri bar. He joined the Democratic party, sold his interest in his Republican paper, and in 1877 secured the position of special European correspondent of the New York *Sun*. In 1879 he bought the St. Louis *Dispatch* and the *Evening Post,* uniting them under the name of the *Post-Dispatch*. From this venture Mr. Pulitzer made a fortune. In 1883 he bought the New York *World,* then considered a bad buy; but he

shaped it into one of the nation's leading newspapers. Mr. Pulitzer was elected to Congress in 1885, but dislike of the duties of office caused him to resign a few months later. His eyesight began to fail in 1887, and by 1889 he was totally blind. With the aid of a corps of secretaries, he continued his work. Mr. Pulitzer attained to wealth and genuine culture by his own efforts. He founded and endowed the Columbia School of Journalism, and bequeathed $500,000 to the New York Philharmonic Society.

Pulley, a simple machine consisting of a wheel revolving on an axis with a rope or chain passing about its circumference. The term block and tackle is often given to the combination. Simple pulleys are of two kinds, fixed and movable. The former has its axis stationary with the cord over the wheel; in the latter the cord supports the wheel which rises and falls with the weight. With a fixed pulley the force and weight are equal, while with the movable pulley, the weight is twice the force. The former is chiefly valuable in changing the direction of the resulting motion, while with the latter a small force can support double the weight. With a combination of fixed and movable pulleys and a single cord, the ratio of the weight to the force applied is equal to the number of cords supporting the movable block. Friction greatly reduces this theoretical advantage, however. The term pulley is also applied to any broad flat wheel for carrying a belt to impart motion in machinery.

Pullman, George Mortimer (1831-1897), an American inventor and financier. He was born in Chautauqua County, New York, and died in Chicago. He was trained in the cabinetmaker's trade. During the construction of the Erie Canal he made money by taking contracts to move large buildings from the line of the proposed waterway, a business in which he showed no ordinary degree of skill. He settled in Chicago as a housemover, builder, and contractor. In making long railway journeys it occurred to him that a sleeping car would be a boon to those who traveled by night. The result was that he fitted up two ordinary passenger coaches with bunks. These proving popular he built the "Pioneer" in 1863. It cost him $18,000, and was the first "Pullman." Mr. Pullman was one of the few men who was inventive and at the same time resourceful in financial affairs. In 1867 he organized the Pullman Palace Car Company, of which he was president. Instead of manufacturing cars for sale, he patented his invention, retained the ownership, furnished his own sleeping equipment, and put his own force of employes in charge of each car. He graciously permitted the railroad companies to haul his coaches without charge, save that he required a guarantee of a certain amount of receipts per day. In 1887 he originated the famous solid vestibule train, the cars of which are so hooded that a passenger cannot fall off or be exposed to the weather in passing from one car to another.

Large works were required for the manufacture of cars. In 1880 Mr. Pullman laid out a town, known by his name, about twelve miles south of the center of Chicago. The streets were laid out attractively. A school, a theater, a library, a large retail store, and miles of workingmen's cottages were built. Mr. Pullman's social aims were perhaps similar to those of the Krupps in Germany, but the workingmen became dissatisfied because the Pullman Company owned everything in sight, including the men themselves. In 1889 they voted to incorporate the town of Pullman with Chicago. The Pullman Company still owned the real estate, of course. Quarrels arose over the water rates and rents and the price of gas. When Mr. Pullman started the town the newspapers regarded the move a great one for the workingman, but enthusiasm died away. Dissatisfaction with the rental part of the general scheme intensified the feeling that led to a notable strike known as the Pullman strike of 1894.

To complete what might well be made a series of interesting articles, we may add that the immediate cause of the Pullman strike was a reduction of wages,—a cut of twenty-two per cent for mechanics and a cut of nineteen per cent in the salaries of all others connected with the shops. Employes testified on oath that at times they were paid not to exceed four cents to a

dollars per week in excess of rents retained. Another organization, notably the American Railway Union, went on a sympathetic strike. Not a Pullman wheel was allowed to turn anywhere. Travel was impeded, the mails were delayed, troops were called out. Debs and other leaders of the men were sent to prison. Eighty million dollars' loss was inflicted upon the business of the country. The general public sided with the strikers, rather than with the Pullman Company, but it was inconvenienced too seriously to desire the strikers to hold out any longer.

See DEBS, EUGENE VICTOR.

Pulmotor, a mechanical device for promoting respiration in cases of apparent drowning, asphyxiation by gas, etc., and in the resuscitation of victims of electric shock; also in creating artificial breathing in newborn infants, when necessary to induce respiration. There are several devices of this nature on the market under various names, the pulmotor being best known to the public. Fire and health departments in cities, and many hospitals are now usually equipped with this device.

The pulmotor mechanism is automatic, and the air inspired by the patient contains about 60 per cent of oxygen, while in other devices pure oxygen is used for resuscitation. There are certain reasons why the apparatus should be used only by skilled persons, and its use for any prolonger period is not advisable. When used for brief periods at a time, not to exceed a few minutes, the intervals should be employed with one of the well-known manual methods of promoting respiration, as by drawing the arms back and forth over the head, etc., these methods being familiar to all students of "first aid." At the first indications of natural breathing in the patient, he should be removed to a pure atmosphere, and nature will then usually complete the recovery.

Pulque, pul'kā, the national beverage of the Mexicans, corresponding to the beer and ale and wine of other countries. It is made from the sap of the agave plant. When the bud of the flower stalk appears in the center of the huge rosette of leaves, a slit is made across the tender center of the plant, and the center of the bud is scooped out to form a cavity. Morning and evening for a month a quart or two of sweet sap is dipped out of this hollow with a gourd and poured into a goatskin bag on the back of a donkey. The fresh juice is fermented, like that of the grape or the juice of barley malt, to make pulque. It is sold throughout the country by the skin, glass, barrel, or bottle, like beer or milk. Agave raising is one of the largest industries in Mexico. A second and stronger liquor called "mescal" is produced from pulque by the additional process of distillation.

See ALCOHOL; AGAVE.

Pulse. See CIRCULATION.

Puma. See COUGAR.

Pumice, pŭm'ĭs, a form of lava through which gas or steam has escaped during the process of cooling, leaving it full of air holes. Three-fourths of typical pumice by weight consists of fine sand converted into minute powdery particles of glass, mixed with alumina, iron, lime, soda, etc. It varies in color from brown to a whitish gray. Although twice as heavy as water, it is so full of air holes that it floats until it becomes watersoaked. Powdered pumice is used to polish marble, glass, and ivory surfaces. It also serves as the gritty ingredient of many tooth-powders. It is used by the painter in polishing wood and metal. A piece of pumice stone in the lavatory is useful to scour stains from the hands. The pumice of commerce is obtained largely from the Lipari Islands, north of Sicily. Pumice of excellent quality is to be had also from Mexico and Iceland.

See VOLCANO.

Pump, a machine for raising water or other fluids to a higher level. In reality all pumps are air-pumps, and are based on the air-pump invented by Otto Guericke. In the ordinary lift pump the piston valve works in a tight cylinder. It is drawn upward by a lever, creating a vacuum beneath it, into which water is forced by atmospheric pressure exerted on the surface of the water in the cistern or well. Inasmuch as atmospheric pressure at sea level is less than fifteen pounds to the square inch, it follows that the lift pump cannot elevate water, under the most favorable circumstances, more than about thirty-two feet. In the case of a force pump the water is elevated

as before into a small cistern, from which it is forced by mechanical pressure to a height limited only by the amount of power available. In the farming districts of the West, pumps are operated chiefly by windmills. The pumps connected with mills, factories, and railway stations are operated usually by engines. A very ordinary steam pump of the larger sort, such as is used in filling city water reservoirs, is capable of pumping a million gallons a day. A pump in the placer field of the Rogue River, Oregon, has a capacity of 13,000,000 gallons a day. Nine thousand gallons are lifted 100 feet each minute. It is not unusual for a steam pump to discharge 150 gallons of water per minute from a mine several hundred feet deep—a stream quite sufficient to irrigate from 80 to 160 acres of land. A pump operated by an irrigation canal company of Beaumont, Texas, has a capacity of 140,000 gallons per minute. See AIR-PUMP.

Pumpkin, a member of the gourd family, closely akin to the squash. Probably native to Central America. At all events the American Indians cultivated pumpkins in fields of corn as is done by their white successors to this day. With pumpkin rhyming so well with bumpkin, and "pumpkin head," a proverbial expression for want of mother wit, it might seem that this honest old vegetable would be left by the poets as hopelessly prosaic; but James Whitcomb Riley has done very well in *When the Frost Is on the Punkin,* and Whittier's *The Pumpkin* recalls the oven and the traditions of Thanksgiving admirably. Boys make Hallowe'en jack-o'-lanterns by cutting holes in the side of a pumpkin—two narrow slits for eyes, a triangular hole for a nose, and a wide horizontal slit for a mouth. Set in a window with a candle inside of it, the pumpkin "jack" is quite effective. For botanical characteristics, see SQUASH.

Pun, a play upon the meanings of the same word or sound. The intent is to raise a laugh by exciting a sense of the ludicrous. Thus an absent husband who sends his wife no money may be said to give proof of an *unremitting* affection. In "The parson told the sexton, and the sexton toll'd the bell," the descent from the pathetic to the ludicrous is rapid.

The pun is not considered a high form of wit, nor is it suited to serious discourse, nevertheless it is used by standard writers. The first act of Shakespeare's *Julius Caesar* is full of puns. Lowell says of Shakespeare that he "sometimes allows his characters to spend time, that might be better employed, in carving some cherry-stone of a quibble," adding, "In a pun our pleasure arises from a gap in the logical nexus, too wide for the reason, but which the ear can bridge at once as, 'Is that your own hare, or a wig?' "

Holmes, himself fond of introducing a pun, defines a pun in effect as a trick of mental optics, "throwing the shadows of two objects so that one overlies the other." "A pun," says he, "is an insult to the person you are talking with," yet in the same passage he ventures to connect the killing of a man by a blow and the killing of a word by a pun with *manslaughter* and *man's laughter.* See CONUNDRUM.

"Ye be burly, my Lord of Burleigh, but ye schall make less stir than my Lord of Leicester." —Queen Elizabeth.

Agriculture is the groundwork of our national prosperity.—U. S. Grant.

Punch, a well known London comic weekly. The first issue appeared July 17, 1841. Henry Mayhew, Mark Lemon, and Stirling Coyne were associate editors. Douglas Jerrold and Gilbert à Beckett were contributors. Ebenezer Landells had charge of engravings and drawings. The enterprise was an imitation of the Paris *Charivari.* The name was borrowed from the principal character in the popular puppet show. Many distinguished writers lent their aid. Thackeray's contributions, since published separately, fill a volume. Other noted contributors were "Tom" Hood, "Tom" Taylor, Artemas Ward, G. A. Sala, and H. K. Browne, the latter under the name of "Phiz." The inspiring genius was Mark Lemon, the first editor-in-chief. He kept Punch free from party bias, and was thus in a position to attack all forms of public wrong, pernicious legislation, and to lampoon the follies, shams, and affectations of society. Punch sold for a sixpence. The first issue ran into its fifth thousand. Subsequent issues reached an immense circulation. It is safe to say that no paper

published in London has had a greater influence in shaping public opinion. One reason lay in the impartial way in which praise and blame were dealt out to friend and foe alike. While intensely British and even confined to London in its sympathies, Punch has not failed now and again to thrill the whole world. It never missed an occasion to ridicule President Lincoln, yet at his death, Mark Lemon wrote, referring of course to *Punch:*

You lay a wreath on murdered Lincoln's bier,
  You, who with mocking pencil wont to trace,
Broad for the self-complacent British sneer,
  His length of shambling limb, his furrowed face;

His gaunt, gnarled hands, his unkempt, bristling hair,
  His garb uncouth, his bearing ill at ease
His lack of all we prize as debonair,
  Of power or will to shine, or art to please;

You, whose smart pen backed up the pencil's laugh,
  Judging each step as though the way were plain,
Reckless, so it could point its paragraph
  Of chief's perplexity, or people's pain:

Besides this corpse, that bears for winding-sheet
  The Stars and Stripes he lived to rear anew,
Between the mourners at his head and feet,
  Say, scurrile jester, is there room for you?

Yes; he had lived to shame me from my sneer,
  To lame my pencil, and confute my pen;
To make me own this kind of prince's peer,
  This rail-splitter, a true-born king of men.

Punch and Judy, a puppet-show at one time popular, and exhibited frequently in the streets. The origin of the story of Punch and Judy is somewhat uncertain. An English ballad of the eighteenth century recounts the adventures of the couple, but certain authorities ascribe the story to Fiorillo, an Italian comedian of the seventeenth century. The tale runs that Punch in a fit of jealousy strangles his infant child. Judy attacks Punch to be avenged. Then Punch seizes a bludgeon and beats Judy to death, throwing the two bodies into the street. An officer finds the bodies, and Punch is shut up in prison. He makes his escape, however, and goes through various adventures, always happy and always getting the best of everyone. He drives the doctor who visits him when he is ill out of the house, has a set-to with Death, whom he beats, and finally outwits the Devil. "As pleased as Punch," has come to be a common expression.

Punctuation, in writing or printing, the art of using certain marks to make plain to the reader the relation of sentences or the different parts of a sentence to each other. The most important points are period, comma, semicolon and colon. Others are the hyphen, apostrophe, dash, quotation marks, interrogation point, exclamation point, parenthesis, and brackets. In ancient Greek manuscripts no marks of punctuation appear. The beginning of a system of punctuation was made in Alexandria, it is believed, toward the close of the fourth century B. C. By the ninth century A. D., the comma was in use. A large dot, or sometimes a double dot indicated the full stop, and a high dot was used as we use colon and semicolon today.

Punctuation is taught in the public schools in connection with English composition, the child learning the various points and their use as he learns to read and to write sentences requiring them. A set of formulated rules is given, usually at the time when a text-book in grammar or rhetoric is required. There is, however, no such thing as a set of hard and fast rules for punctuation. Especially in the use of comma, dash, parenthesis and colon, there is wide room for the display of individual judgment and taste. The tendency is to use fewer points than formerly. In other words, points which show grammatical relations only and are not required for clearness are omitted.

Punic Wars, a series of wars carried on between Rome and Carthage. The First Punic War occurred 264-241 B. C.; the second, 218-201 B. C.; the third, 149-146 B. C. These wars were in reality one continued struggle for the mastery of the Mediterranean world. They resulted in the destruction of Carthage and the complete mastery of Rome. See HANNIBAL; SCIPIO; CARTHAGE.

Punishment, in criminal law, the penalty imposed on those who have committed an offense against the penal law. The object of human punishment should be to reform the offender, to restrict his power of committing further offences against society, and to serve as a deterrent to others

inclined to offending. To the first class of punishments, where the object is reform, belong the forms which are accompanied by great suffering or public disgrace. When the object is protection of society, the familiar types are: capital punishment, a determinate or life period of imprisonment, deportation, banishment to penal settlements, etc. When the object is a warning to society, disgrace and cruelty are resorted to. The question of capital punishment opens a wide field for discussion, as to the way in which it should be executed, the crimes for which it should be used, and the general value to society of this form of punishment. It is favored by those who believe that society must profit by the suffering of the criminals and public executions are resorted to in communities where its terrors are thought to convey to prospective offenders a salutary dread. Since the latter part of the eighteenth century after the movement begun by John Howard, the philanthropist, a wave of reform in the treatment of criminals swept over England, and today it is a recognized fact in all civilized countries that the most successful and humane method of dealing with offenders is that which aims at reform and prevention of crime.

Punjab, pŭn-jäb′, the most northern province of British India. The name is a native word meaning "Five Rivers," having reference to the five great sources of the Indus.

Punka. See FAN.

Puppet, a figure of less than life size employed in the old-fashioned puppet show. The word is French, signifying a doll. Puppets were suspended by wires over the stage. Strings leading to places of concealment enabled the players to twitch the head and limbs, imparting lifelike movements. Puppets were made usually of pasteboard. A manager put questions to the various puppets and told the audience what they were expressing. References to puppets and puppet shows are frequent in English literature. Davenant represents them as follows:

> And man in chimney hid to dress.
> Puppet that acts our old Queen Bess.
> And man that while the puppets play,
> Through nose expoundeth what they say.

Puppet shows were known to the Greeks and Romans. Paris was noted for puppet shows, and still patronizes them. The departure of Noah and the animals from the ark was long a favorite English subject. Punch and Judy shows are of this same nature. The exhibitions of waxworks, for which London is noted, are an outgrowth of puppet shows. At present puppet shows are more popular in Italy than elsewhere.

As a puppet, popularly speaking, is one who dances when someone else pulls the string, the application to kings and politicians, when their actions are governed by others, is apt. This quotation is from the *Britannica:*

> Among the puppet personages presented in the small street shows are generally included a sailor who dances a hornpipe, a hoop-dancer, a dancer of the Highland fling, a wooden-legged pensioner, a vaulter on a pole, also balancing two chairs, a clown playing with a butterfly, a dancing figure without head until the head rises out of the body gradually, displaying an enormously long neck, a juggler tossing gilt balls, which, sliding up and down upon tight, invisible threads, fall into his hands again, a milk woman carrying buckets out of which fly white dolls, and a skeleton seen at first in scattered parts lying about the stage, but piece successively flying to piece, the body first sitting up, then standing, and finally capped by the skull, when the completed figure begins to dance.

See PUNCH AND JUDY.

Pure Food Law, an act passed by Congress in June, 1906 and going into effect January 1, 1907, known as the Federal Food and Drug Act. The purpose of the law was the prevention of misrepresentation and adulteration of foods. The provision reads as follows: "It shall be unlawful for any person to manufacture within any territory or the District of Columbia any article of food or drug which is adulterated or misbranded within the meaning of this act; and any person who shall violate any of the provisions of this section shall be guilty of a misdemeanor, and for each offense shall, upon conviction thereof, be fined not to exceed $500, or shall be sentenced to one year's imprisonment, or both, such fine and imprisonment in the discretion of the court, and for each subsequent offense and conviction thereof, shall be fined not less than $1,000 or sentenced to one year's imprisonment or both, such fine and imprisonment in the discre-

tion of the court." The work of analysis and inspection is entrusted to the Bureau of Chemistry of the Department of Agriculture. Food laboratories have been established in New York, Boston, Philadelphia, Chicago, St. Paul, Detroit, Buffalo, San Francisco, Seattle, Portland, New Orleans, Savannah, Kansas City, Denver, and Cincinnati. The headquarters laboratory is at Washington. In these laboratories the chemical examination of foods and drugs is made. In 1910, of 95,482 samples of foods and drugs that were placed under this examination, about 3,000 were found to be falsified, adulterated, or misrepresented, and declared illegal. The fines collected amounted to $11,049.31. Among food-stuffs one of the important restrictions made was that of refusing to accept flour that had been bleached with nitrogen peroxide. The drug products that most frequently failed to pass the examination of the Bureau were those that were misrepresented in regard to their curative and remedial properties and found to contain dangerous drugs. Most of the states have now individual pure food laws, and among foreign countries partial legislation has been effected in Canada, England, France, Australia, Sweden, and Switzerland.

The law has already served as a protection to those manufacturers and dealers whose aim has been to handle only unadulterated and pure food-stuffs and drugs. The law met with the approval of the public immediately upon its passage, and is generally conceded to be the most important step toward improvement and protection of the food supply that has ever been taken in our country. Dr. Harvey W. Wiley, the head of the Bureau of Chemistry at the time of its enactment, was most energetic in its enforcement.

Purgatory, in the doctrine of the Roman Catholic church, a place of purification after death where souls may atone for their venial or slighter sins, or where they may undergo punishment for mortal sins, the guilt and eternal punishment of which have been remitted. Mortal sins, in the teaching of this church, are those deserving everlasting punishment. It teaches further that souls in purgatory, where they are thought to undergo grievous sufferings, are aided by the prayers of their earthly friends and relatives. Outside the Roman Catholic church there is a widespread belief that all sins which do not meet their punishment on earth must be atoned for after death before the soul is fit to dwell with God.

Puritan, in English history, the adherent of certain religious and political ideas. The Puritans came into prominence soon after the English Reformation. In religious matters they correspond to the followers of Calvin in Switzerland and John Knox in Scotland. Henry VIII shaped the English Reformation with a view to political and financial advantage. Himself in place of pope, he cared personally for no doctrinal change. Forty thousand country gentlemen, enriched by the lands and spoils of the Catholic monasteries, were opposed, it is true, to the restoration of the Catholic church; but they cared little for a change of doctrine. Even the abandonment of the doctrine of purgatory was forced on the political element by the reforming clergy. A considerable body of the English people was dissatisfied with the degree of change. They desired to break not only with papacy, but to "purify" the Church of England by casting off prelacy in the form of bishop, vestment, and book of prayer. This radical party became known in history as the Puritans.

Theologically, it contained three elements, still recognizable. The first would purify the Church of England from prelatic forms and observances. It is represented by the Low Church wing of the Episcopal church. The Puritans who settled New England were chiefly of this class. They hoped to preserve a connection with the Church of England, but distance and the force of events led them into Congregationalism. The second element would establish a national church distinct from government control. The king as church member would rank with the lowliest parishioner. This element is represented by Presbyterianism. The third element, known as Independents and Separatists, would establish individual churches, affiliated, but not nationalized. This element is still represented by Congregationalism. The Pil-

grim Fathers of Plymouth Rock were of the last type.

In politics the Puritans were opposed utterly to the doctrine of the divine right of kings. They supported the idea of a constitutional monarchy or an aristocratic republic. The Puritans were opposed to the Cavaliers. From a habit of clipping the hair, then a new fashion, they were called Roundheads. The Puritan leaders were men of determination and power. England owes them a deep debt. They hedged the English home with safeguards. They beheaded Charles I and made Cromwell dictator. They made the House of Commons the real ruler of England. John Milton wrote with a Puritan pen. Bunyan was a Puritan tinker. Eliot, Pym, Hampden, Vane, and Cromwell were Puritans. Marston Moor and Naseby were Puritan victories. The Puritan fighters were men of stern stuff. In camp they knelt in prayer to the God of Battles. They buckled on their swords in the name of God and country. In the shock of battle they charged to the ringing accents of old Hebrew psalms. We cannot use space to better advantage than to quote a few sentences condensed from Macaulay's *Milton:*

> We would speak first of the Puritans, the most remarkable body of men, perhaps, which the world has ever produced. The odious and ridiculous parts of their character lie on the surface. They were not men of letters; they were, as a body, unpopular; they could not defend themselves, and the public would not take them under its protection. They were therefore abandoned, without reserve, to the tender mercies of the satirists and dramatists. The ostentatious simplicity of their dress, their sour aspect, their nasal twang, their stiff posture, their long graces, their Hebrew names, the Scriptural phrases which they introduced on every occasion, their contempt of human learning, their detestation of polite amusements, were indeed fair game for the laughers.
>
> Those who roused the people to resistance, who directed their measures through a long series of eventful years, who formed, out of the most unpromising materials, the finest army that Europe had ever seen, who trampled down king, church, and aristocracy, who, in the short intervals of domestic sedition and rebellion, made the name of England terrible to every nation on the face of the earth, were no vulgar fanatics. Most of their absurdities were mere external badges, like the signs of freemasonry, or the dresses of friars. We regret that these badges were not more attractive.
>
> The Puritans were men whose minds had derived a peculiar character from the daily contemplation of superior beings and eternal interests. If their names were not found in the registers of heralds, they were recorded in the Book of Life. If their steps were not accompanied by a splendid train of menials, legions of ministering angels had charge over them. Their palaces were houses not made with hands, their diadems crowns of glory which should never fade away. On the rich and the eloquent, on nobles and priests, they looked down with contempt: for they esteemed themselves rich in a more precious treasure, and eloquent in a more sublime language, nobles by the right of an earlier creation, and priests by the imposition of a mightier hand.
>
> Thus the Puritan was made up of two different men, the one all self-abasement, penitence, gratitude, passion, the other proud, calm, inflexible, sagacious. He prostrated himself in the dust before his Maker; but he set his foot on the neck of his king.

> Such as do build their faith upon
> The holy text of pike and gun,
> Decide all controversies by
> Infallible artillery,
> And prove their doctrine orthodox
> By apostolic blows and knocks.
>
> —Butler.

See CAVALIER; CROMWELL; PYM; MILTON.

Purple, a color obtained by mixing pure red and pure blue. Tyrian purple was obtained at great cost from a shellfish,—a sort of Phoenician whelk known as a murex, each yielding but a drop of dye. In the day of Cicero a pound of fine wool dyed with Tyrian purple was valued at $175. From its excessive cost, purple was the emblem of rulers. The consular toga bore a purple border. The Roman emperor wore a purple toga. The term, "royal purple," is still current. Italy kept secret for a century a process of dyeing purple with a sort of lichen. Purple dye is now obtained inexpensively from aniline, a by-product of coal tar.

Purslane. See PORTULACA.

Puss in Boots, an old Italian fairy tale which came into the English probably through the French of Perrault. The cat is a clever animal who secures a fortune for his master, a young miller. A similar story is found in the Scandinavian and in several other languages.

Putnam, George Palmer (1814-1872), an American publisher. He was born at Brunswick, Maine. He became a clerk in a New York bookstore when a lad of fourteen. In 1840 he formed a partnership

under the name of Wylie & Putnam, and in the following year he went to London, where he established a branch business. In 1848 he opened a publishing house in New York City. *Putnam's Magazine,* afterwards absorbed by *Scribner's Monthly,* was founded in this year. In 1866 he established a publishing house under his own name. Mr. Putnam was one of the foremost American advocates of international copyright. He was the author of several books, including *A Plea for International Copyright, The Tourist in Europe, Ten Years of the World's Progress,* etc.

Putnam, Israel (1718-1790), a soldier of the American Revolution. He was born at Salem, now Danvers, Massachusetts, and died at Pomfert, now Brooklyn, Connecticut. His early education was scanty. He began life as a farmer. Boys delight in the stories of his life. An old wolf annoyed the neighborhood for many years, stealing poultry, sheep, and calves, until "Old Put," as he was familiarly called, traced it to its lair in a rocky den, and crawled in after it, slaying the beast single-handed. As a matter of prosaic fact, the den proves so small when seen that it excites ridicule. He served in the French and Indian War. He commanded Putnam's Rangers in the operations around the southern end of Lake George, and was with Abercrombie in the expedition against Ticonderoga. He was at one time captured by the Indians and tortured, but was rescued by French officers, who sent him to Montreal for exchange. Other events in which he took part were a naval expedition against Havana in 1762, and the expedition against Pontiac in the following year. He was a man of active, impetuous nature.

As might be expected, Putnam took a prominent part in the Revolutionary War. When the news of Lexington arrived, it is said he turned his oxen loose, left his plow in the field, leaped on a horse, and set out for Cambridge. He took part in the battle of Bunker Hill. He afterwards rose in church and offered a public apology for swearing on that occasion. He was with Washington at Long Island. A characteristic anecdote is told of his escape from a reconnoitering force of British under Tryon. He was surprised in a position from which there seemed little chance of escape. He rode his horse at breakneck speed down a seemingly impassable rocky precipice and collected troops with which to attack the British in turn. Owing to frequent and prolonged exposure he was stricken with paralysis and incapacitated for service before the end of the war.

Putnam, Rufus (1738-1824), a soldier of the American Revolution. He was born at Sutton, Massachusetts. While a young man he learned to build grist mills and to survey land. Prior to the Revolution he served in the French and Indian War, and was employed in surveying Florida lands. He entered the Revolutionary army as an engineer, but later took command of a regiment. He retired with the rank of brigadier-general. He took a prominent part in the suppression of Shays' Rebellion. In 1787 he became a director of the Ohio Company. It was proposed to employ a capital of $1,000,000 in securing land in the Northwest Territory. A million and one-half acres were purchased from Congress. Location was made in the southeastern part of what is now Ohio. In the year following the passage of the Ordinance of 1787, Putnam located the first colony at the present site of Marietta, Ohio. He held various political and judicial positions in the Northwest Territory. He died at Marietta, the last American survivor of the officers of the Continental Army. His papers and correspondence are cherished by the library of Marietta College.

Putty, a mixture of whiting or carbonate of lime and linseed oil. It is mixed usually to the consistency of dough. To prevent its drying up, it is packed for commercial use in bladders. The glazier uses it to set window panes. He applies the putty with the point of a flexible blade, using considerable pressure. After exposure to the air for a time, it hardens and binds the glass in place. It is used also by the painter to fill inequalities or holes in woodwork before painting. A little paint may be worked in to give it the color of the surrounding surface.

Pygmalion, pĭg-mā′lĭ-on, in Greek legend, a sculptor and king of Cyprus. He had an aversion to women, but, having made an ivory statue of great beauty, he

fell in love with it and besought the gods to give the statue life. His prayer was granted and the beautiful statue became a living woman whom Pygmalion made his wife. W. S. Gilbert used this story as the basis of a play, *Pygmalion and Galatea.*

Pygmy, pĭg′my, a Greek measure of about fourteen inches, being the length from the knuckles to the elbow. The Greek writers, followed by Pliny, the Roman, spoke of little people, a pygmy or two in height, who were supposed to dwell in the interior of Africa. These accounts of the pygmies were considered fabulous until Du Chaillu, 1861, gave an account of tribes of pygmies seen by him in his explorations. Other travelers soon confirmed his account. These pygmy tribes dwell in the forested interior of Africa. Their stature is from two feet nine inches to four feet six inches. They live in temporary villages of huts four feet high clustered around that of the chief.

South American Pygmies. In 1921 two oil prospectors discovered a tribe of about 200 pygmies living within 160 miles of Cartagena, Colombia. Though so close to a city of more than 50,000 inhabitants, this tribe of pygmy Indians had seen only one white man previously to their discovery by the prospectors; this white man was a Spanish priest who taught them the cultivation of corn and sugar cane.

The people average four feet in height and have copper-red skins, high cheek bones, narrow black eyes and straight, coarse black hair. Only the men wear any kind of clothing, and even their clothing consists only of a coarse blanket woven from wild cotton. They live under a canopy of branches and flat leaves stretched on poles from four to seven feet high, each canopy sheltering about fifteen people. Their only weapon is the bow and arrow, with which they shoot fish and monkeys and other small game. They cultivate small pieces of land near the village and gather fruit in the forests. In the published account of these little people it is said that—

> There is perfect realization of the doctrine of equality. There is no one in authority, no apparent government. Social arrangements, so far as the family is concerned, are extremely lax. The only custom governing marriage is to send a girl child, when she is about seven years old, to another canopy to be brought up as a member of her husband's family. See Dwarf.

Pyle, Howard (1853-1911), **an American artist and author. He was born in Wilmington,** Delaware. His chief successes are in the line of original productions, illustrated by himself. Titles of his best works include *The Merry Adventures of Robin Hood, The Wonder Clock, The Rose of Paradise,* and *Twilight Land.*

Pym, pĭm, **John** (1584-1643), an English Puritan. He was a native of Somersetshire, and was educated at Oxford. He entered Parliament in 1621. He pressed the impeachment of the Duke of Buckingham, and when the Parliament of 1640 met he was one of the leading spirits. He was one of the committee that impeached Strafford. Charles I tried to win him over, it is said, by an offer of the lord chancellorship, but in vain. Pym was one of five members of the House of Commons whom Charles endeavored to arrest by force. He died before the arrest and execution of Charles. His remains were laid at rest in Westminster Abbey. Six of his fellow members carried his body. Both houses followed in procession. Pym was for twenty years the leader of the House, and is by some writers regarded as the founder of party government in Parliament. See Puritans.

Pyramid, a massive structure of masonry peculiar to Egypt, though somewhat similar structures have been found in Mexico, Nubia, and elsewhere. The pyramids of history and literature are confined to middle Egypt. They are tombs, standing in ancient cemeteries. There are five groups, all on the west bank of the Nile. Beginning at the old burial ground of Gizeh, opposite Cairo, a few miles above the beginning of the delta, they extend south for sixty or seventy miles. There are about forty pyramids in all. The most notable group is that of Gizeh. It consists of three large pyramids and several small ones. The largest of all is the so-called Pyramid of Cheops. It differs from the others chiefly in size. It rests on a square base and has four equal triangular sides sloping up to a point. The Great Pyramid, as it is also called, is without doubt the largest structure ever built by man. It is one of the Seven Wonders

BUILDING THE PYRAMIDS
From the Painting by G. Richter

of the World, the only one which remains. The base is about 756 feet on a side. The perpendicular height was originally 481 feet, but thirty feet of the apex have disappeared. The mathematically curious have noticed that the base lacks but six-tenths of an inch of being a perfect square, and but twelve seconds of a degree of being a perfect rectangle, and that the ratio of the height and the sum of the four sides is equal to the ratio of the radius of a circle and the circumference. This pyramid covers a space of over twelve acres.

According to Herodotus, whose authority may have been tradition or mere conjecture, 100,000 men were occupied thirty years in quarrying the stone and building the pyramid. The principal stone used was a white limestone or marble. Huge blocks were cut from the quarries with bronze saws set with diamond or corundum teeth. Some sort of hoisting machinery was used, no doubt, for handling the blocks, but no information on this head has come down. Two hundred and three courses of these blocks are still in place, giving the outer surface a terraced appearance. It is with reference to this step-like structure of the masonry that Longfellow in his *Ladder of St. Augustine* writes:

> The mighty pyramids of stone
> That wedge-like cleave the desert airs,
> When nearer seen, and better known,
> Are but gigantic flights of stairs.

The blocks employed in the lower courses are four feet ten inches high. Each block weighs over fifty tons. They are fitted together with such exactness that the joints can hardly be detected. When completed, the outer surface was finished with smaller stones and mortar, but this casing has fallen away leaving the terraces in view. It is estimated that the entire edifice contained over 143,000,000 cubic feet of masonry.

A passage about four feet high and three feet and one-half in width enters the northern face of the pyramid about forty-nine feet above the base. It slopes slightly downward, until it reaches a chamber 321 feet from the entrance. This chamber is forty-six feet long by twenty-seven feet wide and eleven and one-half feet high. It is lined with polished slabs of red granite. Single slabs reach from the floor to the ceiling. It is roofed with nine large slabs, highly polished and joined closely together. This chamber contains a sarcophagus of red granite, nothing else. It is conjectured that it was the burial place of the great Cheops, but that his wooden coffin and mummy have been removed. The sarcophagus is too large to have been brought in through the passage. It must have been put in place when the pyramid was in process of erection. This chamber is in the living rock beneath the foundation of the pyramid. The passage is continued beyond the chamber over fifty feet through the rock without apparent purpose. A branch from the main passage leads off in a slightly upward direction toward the center of the pyramid. It also has several branches terminating in chambers. Two of these, for want of better names, are known as the king's chamber and the queen's chamber respectively. The king's chamber is thirty-four feet long by seventeen feet wide and nineteen feet in height. The queen's chamber is smaller. Both are finished in highly polished granite.

A careful survey of the pyramids shows that they are all built with their sides facing toward the four points of the compass. Each was in all probability surrounded by a stone wall. Traces indicate that a temple was built on the east side of each pyramid, so that worshipers faced directly west, toward the burial place of the king.

The pyramids stand in ancient burying grounds. Each is a mausoleum and monument combined. Each was designed to contain the remains of a single person. The passage leading to the sepulchral chamber zigzags frequently from one direction to another, as though to obscure the entrance. Without doubt, heavy blocks of stone set on pivots served as doors. One chamber is described as entered from the top by a circular opening, which was closed by a huge red granite plug, fitting like a cork into the neck of a bottle. Texts of a religious nature, cut in hieroglyphic characters, are found adorning the sepulchral chambers. It is impossible to assign dates with any degree of accuracy, but it is believed that the period of pyramid building extended through twenty centuries, and that none were built later than 2500 or 2000 B. C.

See EGYPT.

Pyramus (pĭr′a-mus) **and Thisbe,** thĭz′-be, in classical legend, a pair of lovers whose parents, on account of a family feud, forbade marriage. They were able to converse occasionally through a chink in the wall which separated their homes. On one occasion they arranged to meet under a mulberry tree at the tomb of Ninus. Thisbe reached the trysting place first, but was frightened by the approach of a lioness, her jaws bloody from some recent slaughter. Thisbe ran away, but in her flight dropped her mantle. The lioness tossed and tore the mantle, staining it with blood. Pyramus soon after reached the spot and saw the footprints of the beast and the blood-stained garment. Believing that Thisbe had perished and feeling himself to blame, he drew his sword and plunged it into his heart, the blood staining the white mulberries of the tree under which he had planned a happy meeting. Soon after, Thisbe drew near again. When she saw her dead lover, the sword by his side, and her own blood-stained mantle, she realized what had happened and, seizing the sword, took her own life, praying that the mulberry tree might retain the marks of death. So ever after the mulberry has borne purple fruit. Shakespeare introduces a travesty of this story in *Midsummer Night's Dream.*

Pyrenees, pĭr′e-nēz, a range of mountains forming a natural boundary between France and Spain. The main summits reach a height of about 11,000 feet. The range is very regular in its structure. It may be said to occupy a region 300 miles in length and seventy in width. The main axis branches at right angles with regularity, and these branches throw off short spurs parallel to the main range, giving the entire range a fern-leaf pattern. Highways and railroads pass at either end between the mountains and the sea. There are but two intervening passes practicable for vehicles. The entire range is described as a series of terraces, precipices, deep ravines, and brawling mountain torrents. The core of the mountains is granite. Limestone and chalk are chiefly in evidence. There are deposits of coal on the Spanish slopes. There are glaciers on the northern slopes of the central region. A number of plants, including a yam, are not found elsewhere. The Pyrenean ibex is confined to this range. The mountain streams are inhabited by a peculiar water mole. Scientists have given considerable study to the bright insects found in the limestone caverns. See BASQUES.

Pyrites, pĭ-rī′tēz, a common mineral consisting of one atom of iron to two atoms of sulphur. It is brass-yellow in color. When rubbed like a pencil, it makes a greenish-black streak. From its appearance it is called fool's gold. The early explorers of Virginia took home shiploads of iron pyrites under the impression that they were carrying gold. When roasted it gives off a smell of sulphur. This is the miner's test. Owing to the presence of sulphur, pyrites is used largely in the manufacture of sulphuric acid. It is obtained in commercial quantities in various localities from Maine to Georgia. It abounds in the Rocky Mountain region. Old World supplies are found at Rio Tinto in Spain, Avoca, Ireland, and elsewhere. Sometimes the mineral occurs in the form of beautiful crystals. Fine specimens are found in the Isle of Elba; Cornwall, England; Peru; Chester County, Pennsylvania; and Central City, Colorado. Nodules of pyrites, found in the chalk beds of western Europe, were employed instead of flint. The French called it the musket stone. The term pyrites is a Greek word, meaning fire. Bits found in prehistoric dwellings indicate that primitive men used it to produce fire. The old saying, "as worthless as fool's gold," hardly holds true. Several million dollars' worth are mined annually for the sake of the sulphuric acid obtained. The name pyrites is applied also to compounds of sulphur with copper, cobalt, nickel, and arsenic.

Pyrotechnics. See FIREWORKS.

Pyroxylin. See GUN COTTON.

Pyrrhus, pĭr′us, a king of Epirus. He lived about 318-272 B. C. He was a cousin of Alexander the Great, and, having had some small success in wars with his immediate neighbors, he became fired with an ambition to create an empire in the West as Alexander had done in the East. Rome was busy bringing the Greek cities of southern Italy under her sway. Tarentum, an opulent city, was the last to hold out, and sent a call for help to Pyrrhus. He ac-

cepted gladly. He landed on Italian soil in 280 B. C. with a fine army and a force of war elephants, something new to the Romans. Pyrrhus won the first battle decisively, but, as he looked over the field strewn with the bodies of his choicest soldiers, he exclaimed, "Another such victory, and I shall be ruined," hence an expensive success is called a Pyrrhic victory. The Romans were all but ready to treat for peace, but old Appius Claudius, a blind senator, cried out, "Rome shall never make peace with a victorious foe." According to the Roman tellers of the tale, the ambassador of Pyrrhus returned to him with the report that it was useless to make war on Rome, for the Senate was like an assembly of kings—unconquerable. Pyrrhus won a second victory as costly as the first, crossed into Sicily to stir up the cities there, recrossed to Tarentum, was defeated by the Romans, and returned home a disappointed man. According to all accounts, he met his end while storming the Greek city of Argos. A woman stunned him with a tile thrown from a house top, and he was slain ere his supporters could rescue him.

Pythagoras, pĭ-thăg′o-ras, a Greek mathematician and philosopher. He was born on the isle of Samos. He lived about 582-500 B. C. He traveled extensively and settled down at Crotona, a Greek town in Magna Graecia, Italy. Here he built up a school of philosophy or learning. Many of his ideas were fundamentally correct; others were errors. He set in motion the doctrine that the earth turns on its axis, and that the planets revolve about the sun. He believed that the heavenly bodies in their movements produced heavenly music, celestial harmony. The geometrical principle that the square described upon the hypothenuse of a plane right-angled triangle is equal to the sum of the squares described upon the other two sides is called the Pythagorean Theorem. Pythagoras held to the doctrine of the transmigration of souls. He thought that at death the soul passed into the body of some animal. He is said to have requested a man to leave off beating a certain dog, declaring that in the cry of the dog he recognized the voice of a deceased friend. See PTOLEMY.

Pythian Games. See OLYMPIC GAMES.

Python, pī′thŏn, a large serpent of the Old World. The name is applied to a family of sixty or seventy species inhabiting the tropical regions of Africa and Asia. These serpents are allied to the boa constrictor and the anaconda of South America. The reticulated or spotted python inhabits the jungles of the Malay peninsula, Sumatra, and Borneo. It is the largest serpent of the Old World. It attains a length of twenty-five feet. It is an open question whether this python or the anaconda is the largest serpent in the world. Like its relatives, this eastern python is not venomous. It does not attack man. It lives on monkeys, birds, goats, wild pigs, wild fowl, rabbits, the small hog deer, pheasants, and jungle fowl. Occasionally one comes out of the jungle at night and forces its way through the palisades of a village and robs the hen roosts. In such a case the villagers are likely to capture the python and sell it to some dealer in wild animals. Each year the dealers of Singapore ship the menageries of the western world about fifty specimens of the reticulated and black-tailed pythons, the two largest species. It is easier to obtain a python than a boa constrictor or an anaconda. For that reason, this serpent is the one usually shown in collections of large animals. In captivity the python is fed once in two weeks with full feathered, large chickens or rabbits. Sometimes it refuses to eat. In that case a string of rabbits is tied to a pole and thrust down the python's throat. Kipling is the first author to render the python even endurable. Read his account of wise old Kaa in the *Jungle Books*. See ANACONDA.

The limbless serpent can outclimb the monkey, outswim the fish, outleap the zebra, outwrestle the athlete and crush the tiger.—Owen.

Q

Quack Grass, a common and very troublesome weed known also as couch grass, quick grass, dog grass, twitch grass, quitch grass, wheat grass, etc. Probably the last-mentioned name is due to the likeness to wheat, for they belong in the same genus. Quack grass is good pasture, but very hard to get rid of as a weed, for it has a long underground stem that can send down roots at every node. Ordinary ploughing merely cuts the stem without injuring its power of producing new plants. The summer is the best time for exterminating it, when the land is either lying fallow or being made ready for a root crop. Then by a deep ploughing which goes below the roots, rolling, grubbing, and harrowing, plus a hand picking, it may be gotten rid of. Small areas may be cleared by smothering it. Patent medicine venders buy the roots and use it in making what is known as "quack" remedies, for its medicinal value is known to be very slight, if any.

Quadroon. See MULATTO.

Quagga, an animal of the horse kind formerly abundant in southern Africa. It was closely related to the zebra. Head, neck, and shoulders were of a dark brown, shading off to a lighter brown along the back. The croup was gray; under parts white. The stripes were like those of a zebra, but did not extend to the hind quarters. In a wild state the quagga was a beautiful, agile animal. Large droves roamed the plains of Kaffirland. It was hunted by the natives for its flesh and was the natural food of the lion. It is believed to be extinct. See ZEBRA.

Quahog. See CLAM.

Quail, a handsome game bird allied to the partridge and grouse. There are several species. The Virginia, or common quail, emigrates, but is not migratory. It breeds as far north as the severity of the winter permits. After a few mild seasons it becomes comparatively numerous in the copses and grain fields of southern Minnesota; and then again it is almost exterminated by a severe winter. In the breeding season the quails are scattered in pairs, but toward fall they fly in coveys and small families draw together. In cold weather they huddle together tail to tail on the ground, and when surprised spring out with a whirr that startles one. The spring call of the male is the well known *bob-white* easily imitated by whistling boys. Of all birds on the farm the quail is the most cheery and enheartening. It is a pity that each autumn must witness its slaughter by the eager sportsman. Some game birds are destructive, others fly away when they have bred; but the parent quails and their family are almost a part of the farm in sheltered localities. Fortunately the quail raises a large brood, ten to eighteen. A smaller quail is found in the pineries of Florida. The quail of the Old World with which the children of Israel were fed in the wilderness is a different bird, a trifle smaller and more like a partridge. Unlike the American species, they are unable to sit in trees. They are migratory. In the autumn, when the broods fly south from their northern summer homes, immense quantities are taken on the coasts and the islands of the Mediterranean. See GROUSE.

Quakers. See FRIENDS.

Quantity, in mathematics, that property which makes a thing capable of being increased, diminished, or measured, such as space, number, time, weight, mass and force. The mathematical symbols by which quantities are represented are also known as quantities. In algebra the following are distinguished: real and imaginary, known and unknown, constant and variable, rational and irrational. Positive and negative quantities are indicated respectively by plus and minus signs. In grammar and prosody quantity refers to the duration of syllables, the time taken for the pronunciation of a syllable. In logic, by quantity is meant the degree to which the predicate of a proposition affirms something of the subject. The proposition is universal or particular in so far as the predicate affirms a thing of the whole, or of a part of the subject. In music, quantity is relative tone duration.

Quarantine, kwŏr′an-tēn, a term originally of forty days, but now of varying length, during which a ship arriving from a port known to be infected with cholera, yellow fever, or other contagious disease is obliged to lie to and refrain from intercourse with the port at which it arrives. The laws differ in various countries. In Great Britain the entire matter is now left to the discretion of local boards of health. In the ports of the United States quarantines are maintained under national authority. Emigrant ships in particular are required to await inspection before landing passengers. The length of time during which ships are held in quarantine varies so greatly according to circumstances that no synopsis of regulations can be given. In San Francisco, for instance, the quarantine officers fumigate every article capable of harboring insects. Funeral wreaths are burned lest they introduce insects harmful to fruit trees. Local boards of health also quarantine households in which contagious diseases appear. The length of time varies locally also with the nature of the disease.

Quaritch, Bernard (1819-1899), a famous bookseller. He was born in a village of Prussian Saxony. He learned the bookseller's business with a firm in Berlin and established himself in London in 1846. In the following year he sent out his first list—a single page—of old books. His latest *Catalog of Old Books and Manuscripts* was issued in 1887-8 in seven volumes. He was a noted dealer in rare books, a well known figure at book auctions. His knowledge of binding and editions was remarkable. He paid and exacted fabulous prices for rare publications. The leading librarians, booklovers, collectors, and even royalty, were his patrons.

Quarry, a place where stones are removed from the earth. The word has reference to s*quar*ing, or a place where stones are s*quar*ed. A pit from which coal or a metal is taken is called, by way of distinction, a mine.

Quart, a measure of capacity. Literally, it is a fourth part. Applied ordinarily to the fourth part of a gallon. See GALLON.

Quartermaster, in military affairs a regimental officer. In the United States army, he is appointed by the colonel, subject to the approval of the secretary of war. He has the rank and pay of a lieutenant. It is his duty in the field to mark out the camp and to superintend the assignment of quarters and distribution of clothing, fuel, and rations. In permanent quarters he has charge of the barracks or tents. The quartermaster department at Washington has general charge of military quarters. It provides for the transportation of the army, and purchases all clothing, food, tents, horses, and forage. The providing of stationery and medicine also comes within the province of this department. Emergency expenses, such as the employment of spies, interpreters, guides, the pursuit of deserters, the burial of officers and soldiers, and the care and maintenance of national cemeteries, are in charge of the department.

Quartet, or **Quartette** (fourth), a musical composition in four solo parts, or a company of four performers or singers. A string quartet includes two violins, a viola, and a violoncello. A mixed vocal quartet includes a soprano or treble, an alto, a tenor, and a bass. Musical critics say that the quartet is the highest form of parlor music. It reached its development in modern times, about the end of the eighteenth century.

Quartz, a mineral compound of silicon and oxygen. It is one of the most abundant rock materials, constituting large masses, as well as the sands of the desert and the seashore. Crushed it forms a beautiful sand. It enters into the make-up of granite, gneiss, quartzite, and sandstone. It is hard, scratching glass easily, and cannot be melted at ordinary temperatures or dissolved by ordinary acids. For this reason, glass, which is chiefly quartz, is valuable in a laboratory and in the household. Many varieties of pure quartz are colored, as rose quartz, the opal, the amethyst, the smoky quartz, chalcedony, sardonyx, agate, carnelian, onyx, and agatized wood. Pulverized quartz is frequently used in preference to sand, being clearer and purer, for making glass and porcelain. It is also used for making sandpaper, as the crushed particles have a fresher, sharper fracture than worn sand. The mineral known as pebble, used for spectacles, is a transparent quartz. See SAND; SILICON.

Quassia, or **Bitter Ash,** a tropical tree or shrub of South America, said to have been discovered by a Negro slave named Quassi. It is a small tree, about twelve feet in height, and it bears crimson flowers. The wood is used for furniture. It is known as bitterwood, and possesses medicinal properties which have led to its being used in dyspepsia. There is a penalty now against substituting it for hops in making porter, beer, and ale. Another tree discovered in Jamaica and bearing the popular name of bitterwood, or bitter ash, has similar properties and in use the two are frequently interchanged.

Quebec, the oldest and the largest province of Canada. In the days of French rule, Quebec constituted the whole of Canada, or New France as it was then called, and to this day the province retains clear evidence of its French origin, not merely in the speech of its inhabitants, but in their religion, social customs, laws and architecture. When New France became British North America, in 1763, there were about 70,000 white people in the country. The British government wisely allowed these people to preserve their French customs and institutions, with the result that Quebec today is like a bit of transplanted France. The heart of old Quebec is the St. Lawrence valley, east of Montreal. There the farms and roads are laid out as regularly as the blocks of a great city. Every two miles runs one of the main macadamized roads, at regular intervals cut at right angles by crossroads. In parts these roads look like a village street, for the farms all have narrow frontage on the road, and each group of farm buildings is close to its neighbor.

Over 85 per cent of the population of Quebec is of French descent. The English-speaking people live mainly in the region between the St. Lawrence and the Richelieu rivers and the American boundary. This region, usually called the Eastern Townships, was first settled by United Empire Loyalists who migrated northward from New England during the revolution. They and their descendants belonged to the Anglican, Presbyterian and Methodist churches, but the French Canadians almost to a man are Roman Catholics.

Quebec's first census was taken in 1665. After that year it was taken at regular intervals until 1831, since then it has been taken regularly each tenth year. In 1790, when the name Quebec was changed to Lower Canada, the population was 161,000. The first Dominion census, in 1871, gave a total of 1,191,516, and the 1921 census gave 2,361,199.

Size and Physical Features. Since 1912 Quebec has been about one-fifth part of Canada, for in that year its boundaries were extended to include the whole of the Labrador peninsula except a narrow strip on the Atlantic coast, which still belongs to Newfoundland. By that act the area was increased from 351,873 square miles to 706,834 square miles. This is more than two and one-half times the area of Texas.

Quebec is naturally divided into three sections, well defined but unequal in size. Much the largest part is the plateau north of the St. Lawrence River, including the Labrador peninsula. Here and there outcroppings of the Laurentian Mountains form bold bluffs to break the surface. Crossing this plateau on an irregular line from east to west is a height of land, which divides the rivers flowing into the St. Lawrence Valley from those flowing to Hudson Bay or the Atlantic Ocean. The Hamilton River, which flows into the Atlantic, is famous for the Grand Falls, a plunge of 316 feet after a series of cascades extending for twelve miles. South of the height of land are countless streams emptying into the St. Lawrence. Chief among them are the Ottawa, Gatineau, St. Maurice and Saguenay. Flowing into the St. Lawrence from the south are the Richelieu, which drains Lake Champlain; the Chaudiere, with its beautiful falls; and the St. Francis, a great source of water power. Quebec also has innumerable lakes, most of them abounding in fish.

The second division of the province is the St. Lawrence Valley, a narrow strip nowhere more than a few hundred feet above the sea, except in isolated spots like Mount Royal at Montreal, where igneous rocks have been forced through the later strata. East of this valley-plain is a continuation of the Appalachian mountain sys-

tem, broken and hilly, and rising to a height of 4,000 feet in the Notre Dame Mountains. The general direction of the hills is to the northeast, terminating in the elevated Gaspé Peninsula.

The abundance of rivers and lakes has naturally a marked influence on the plant and animal life. In many of the river valleys are forests of hardwoods, with frequent stands of spruce and pine. Flowers,—hepatica, claytonia, violet, aster and golden-rod—are everywhere in the fields of southern Quebec. Waterfowl of every variety frequent the lakes in summer, but in winter they fly southward to more genial climates. Birds are not the only wild animal life, for moose, caribou, deer, bear and lynx roam the unsettled parts. Otter, mink, weasel, muskrat and beaver are the most important of the fur-bearing animals, all of which are now protected by provincial laws designed to prevent their extermination.

Natural Resources. Quebec's wealth in minerals and forests is still unmeasured; the minerals have not all been located, and the forests not all surveyed. But enough is known and produced to make it certain that exploitation of these two sources of wealth has but begun. Quebec supplies about 80 per cent of the world's asbestos from the mines in the eastern townships, principally at Thetford and Black Lake. The average yearly output, about 125,000 tons, is worth about $10,000,000. This is nearly one-half of the total mineral output of the province. Cement, marble and limestone, graphite, manganese, copper and silver are mined in varying amounts.

According to the latest estimates, Quebec has a forest area of not less than 150,000,000 acres, not including vast tracts in Ungava, or New Quebec, which have been neither explored nor surveyed. Two-thirds of the forest area still remains in the hands of the government, and of the remaining one-third the largest part is merely leased by the government to lumbermen. Lumbering is one of the leading industries, and centers around the headwaters of the Ottawa, the Gatineau, and other rivers. Timber is cut in the winter, and in the spring the logs are floated down to mills situated near falls. Spruce is cut in the largest quantities, because it is in great demand for pulpwood; next in order are white pine, hemlock, balsam, fir and white cedar. In various sections are important stands of oak, beech, birch and maple. The yearly product of Quebec's forests is worth approximately the same as the minerals, about $20,000,000. Both the provincial and Dominion governments supervise the cutting of timber under license, and there are also large areas set aside in reserves. The largest of these are the Saguenay and Labrador reserves, including about 110,000 square miles.

In the vast plateau region north of the St. Lawrence River the soil varies greatly in fertility, many sections being either swampy or barren and rocky. But in the river valleys of southern Quebec the soil has a high degree of fertility and farming is the chief occupation. Of the total area of the province less than 8 per cent is occupied farm land, of which in turn about one-half is improved. Roughly speaking, all the fertile land south of the St. Lawrence is occupied. In the eastern townships, where soil and climate are like those of Vermont, dairying is the chief agricultural branch. Butter and cheese are also made in large volume in the St. Lawrence Valley, the output of these two items alone having about the same value as all the minerals and forest products. Of the field crops, hay, clover and oats; potatoes, turnips and other root crops; buckwheat and barley are the most important. Apples, plums, pears and small fruits are raised successfully in the southern part of the province. Tobacco, of which seven to eight million pounds a year are raised, is confined on a commercial scale to the island of Montreal.

Manufactures. To the variety of its natural products, Quebec adds one other great resource, abundant water power. It has no one great single source, such as Ontario has in Niagara Falls, but almost every stream is a source of power, with sawmills, grist mills and factories on its banks. Quebec has perhaps 600,000 horse power developed, and has ten times that amount available. The United States, for comparison, has a total of about 35,000,000 horse

power, developed and available, combined. Montreal is the manufacturing center, especially for leather goods, iron, cotton and woolen goods. There are also factories for boots and shoes and other leather products at Quebec and St. Hyacinthe, and iron works at Three Rivers and Sherbrooke. Manufactures have increased tremendously in value since 1900, partly as a result of natural growth and partly as a result of the extraordinary expansion demanded by the World War. In 1900 Quebec's manufacturing industries had a production of $158,000,000; in 1910 of $350,000,000; in 1915 of $715,000,000; and in 1917 of $830,000,000. In 1917 Montreal alone produced more than three times the total for the province in 1900. Quebec produces about one-third the value for the Dominion, this fraction remaining fairly constant year after year.

GOVERNMENT AND EDUCATION. As in all the other provinces of Canada, the titular head of the government is the lieutenant-governor, who is appointed by the governor-general in council. Five years is his usual term of office. The responsible head of the government is the premier and president of the executive council, which varies in size from nine to twelve or even more members. These members are the heads of the executive departments, and hold office as long as their chief. The legislature consists of two houses, a council of 24 members appointed by the lieutenant-governor, and an elected assembly of 82. Quebec always has 65 members in the Dominion House of Commons, this number being fixed by the British North America Act; representation of the other provinces is fixed by the ratio of their population to that of Quebec.

The provincial courts comprise a court of appeals, officially called court of the king's bench, a superior court, and district courts. Judges of the two first mentioned are appointed by the governor-general of the Dominion. Local police judges and justices of the peace have limited jurisdiction. For the purposes of local government, the province is divided into counties, which are subdivided into townships. Cities and towns may be incorporated in accordance with the usual provisions, and they have their own mayor, council and local magistrates.

EDUCATION. In education Quebec presents marked differences from other provinces. The public schools are under the general supervision of the superintendent of public instruction, who is assisted by a council of 35. The council is divided into two committees, one of which runs the Roman Catholic schools, and the other all Protestant schools. Owners of property pay taxes in one of three "panels": Roman Catholic, Protestant or neutral. Corporations pay in the last panel, which is divided between the first two on the basis of population. Local taxation is supplemented by small government grants, which are similarly divided. McGill University at Montreal, and Laval University, at Quebec, are respectively the leading Protestant and Catholic universities.

HISTORY. The history of Quebec properly begins with the explorations of Champlain and his efforts to establish permanent settlements in New France. Champlain made his first voyage to Canada in 1603, and in the next year assisted Pierre du Guast, Sieur de Monts, in bringing out a number of colonists, who finally settled in Nova Scotia. That settlement was broken up by the English in 1613, but in the meantime Champlain (in 1608) had established at Quebec the first permanent settlement in Canada. Champlain's efforts to secure settlers were supplemented by the work of the Recollet fathers, who first arrived in 1615, and by the Jesuits, who came ten years later. Priests and monks labored zealously to build up a Catholic New France, and early established the authority of the Church in matters temporal as well as spiritual, thus creating a conflict or division of interest which all but wrecked the colony. The plain truth is that during the first years of its existence the colony of New France was mismanaged about as grossly as possible and yet survive. Richelieu attempted to mend matters by handing New France to a company, popularly called the Company of the Hundred Associates, but he accomplished little. Three Rivers was founded in 1634 and Montreal in 1642, but for some years these were little more than

trading stations. Champlain died in 1635, and twenty-five years after his death there were fewer than 2,500 white people in all of New France.

The year 1663 marked the beginning of a new era, a century of expansion and development. In that year Louis XIV dissolved the Hundred Associates, or Company of New France, and placed the colony directly under royal control. Until the British army in 1760 upset the arrangement, New France thereafter was ruled by an absolute and paternalistic government, comprising, first, the governor, who supervised the routine of government, commanded the army, and made treaties with the Indians; second, the intendant, a sort of business manager, who controlled financial matters and also had large independent judicial and lawmaking powers; and third, a superior council, including these two officials, the bishop, and a varying number of councillors, all appointed by the king and serving as the legal mouthpiece of government.

During this period was built up the feudal system which survived in Quebec until 1854. Large grants of land were made to prominent men, called seigneurs. They, in turn, granted smaller parcels to habitants or censitaires, whose tenure of the land was contingent on the payment of annual dues in money or produce. Unlike the New England villages, in which the houses were usually grouped around a common center, the French Canadian villages stretched in long lines along roads or on the banks of streams. Each habitant received a strip of land, with a narrow frontage on the river, and stretching back sometimes for miles into the interior.

Louis XIV appointed as first intendant Jean Talon, an administrator of more than ordinary ability. Under his direction ships were built, trade begun with the West Indies, and a brewery built to lessen, so he said, the consumption of brandy. Talon continued to send exploring parties westward, and also urged the seizure of New York. Talon's business management, together with a successful campaign in 1667 against the Mohawk Indians, attracted a thin stream of immigration, which continued under the rule of Frontenac, who was without question the ablest of the French governors. He was a soldier by training, hot tempered, often arbitrary, energetic, ambitious for New France no less than for himself. Either by tact or by show of force, he won the respect of the Indians, and by aiding Joliet, Marquette and other explorers he greatly added to the territory open to the fur traders.

The last years of Frontenac's rule were marked by the beginning of the struggle between France and England for supremacy in North America. The details of these wars are told elsewhere (see FRENCH AND INDIAN WARS). The issue was decided on the Plains of Abraham, on September 13, 1759, when the English under Wolfe defeated the French under Montcalm and took Quebec. At that time there were about 60,000 settlers in the colony, about 8,000 in Quebec and 4,000 in Montreal.

By the Treaty of Paris in 1763 all of Canada passed under the rule of Great Britain. After a decade of hesitation and discussion, the British Parliament in 1774 passed the famous Quebec Act, providing a form of government for the province. It created great indignation in England and also in the Thirteen Colonies, but it conciliated the French Canadians, and was perhaps the determining factor in keeping Quebec loyal when the other colonies revolted. Its three essential features were the extension of the Quebec boundaries to include all of the territory north of the Ohio River and east of the Mississippi, the substitution of French civil law for English law, and the suppression or at least withholding of English representative institutions.

By the end of the Revolution there were in Quebec no fewer than ten thousand Loyalists who had migrated northward from the revolting colonies and settled in the St. Lawrence valley. These settlers, accustomed to English institutions, now petitioned for the creation of a separate district, which was provided by the Constitutional Act of 1791. Upper Canada (Ontario) and Lower Canada (Quebec) remained separate provinces for exactly

fifty years. The political history of this period is complicated by an occasional outburst of hostility between the two races. One result of this hostility was that in 1837, when the discontent in both provinces reached the point of open rebellion, very few prominent French Canadians were willing to follow the lead of the radicals, Mackenzie in Ontario and Papineau in Quebec. Papineau's object in rebelling was to set up an independent Canada (see PAPINEAU, LOUIS JOSEPH). The rebellion collapsed practically in a day, but it served the good purpose of calling attention to the problems of government in Quebec; the Earl of Durham was sent from England to study the situation, and as a result of his recommendations, Upper and Lower Canada were reunited in 1841. The Act of Union established a parliament of two houses, a legislative council appointed by the governor-general, and a legislative assembly elected by the voters.

The next quarter century was a period of continuous political storm. The frequent conflict of interest between Quebec and Ontario was modified but not removed by the inclusion of party leaders from both provinces in every cabinet. Party government became increasingly more difficult as the years passed, until finally it became clear that a new system was necessary. Out of the storm finally arose the Dominion of Canada, established in 1867 by the terms of the British North America Act.

The coming of Confederation marked an era in Quebec's history as it did in that of each of the other provinces. Previously the machinery or forms of government had been a constant source of political argument. By Confederation these forms were definitely established. Thereafter politicians concerned themselves rather with the solution of problems raised by the operation of machinery than with changes in the machinery itself. Considered broadly, the Liberal and Conservative parties have differed only slightly in matters of provincial policy. More often than not, changes in provincial administration have been the result of shifts in the popular attitude on national problems. Both parties have regularly insisted on the maintenance of French Canadian rights as originally set forth by the Quebec Act, and have sought larger subsidies from the Dominion government and have tried to improve educational methods. Both parties, too, favored the extension of provincial boundaries, as finally effected in 1912. Quebec has been a conservative but loyal member of the Dominion. Only on three occasions, during the Riel Rebellion of 1885, during the South African War, and again during the World War, has there been any real effort to arouse anti-English sentiment, and each of these attempts has failed miserably.

Quebec, the oldest city in Canada and the capital of Quebec province, is situated on Cape Diamond, a bold, high promontory formed by the junction of the St. Lawrence and St. Charles rivers. The city is served by ocean-going steamers and by the Canadian Pacific, the Grand Trunk, the Intercolonial and other railroads. Quebec is 165 miles northeast of Montreal.

DESCRIPTION. Quebec was the capital of New France and for many years the seat of French influence in America. On the bluff that rises 333 feet above the river the French settlers built their capital, which still has the appearance and much of the atmosphere of a medieval European city; it is divided into an upper and lower town. Upper, or old, Quebec, is partially walled and some of the original fortifications are still here. Crowning Cape Diamond is a picturesque citadel that occupies 40 acres of land. Narrow streets and stairs and an elevator provide access from lower to upper Quebec. The lower town is the business and commercial center, while the most handsome residences and the chief attractions are in the upper town. Along the foot of the bluff runs a wide driveway, passing the spot where Montgomery fell and the path that Wolfe used to scale the height. Almost all of the older streets are narrow and many of them are crooked; and these combine with the old walls and fortifications and the low, quaint houses to create a strong sense of the influence and tenacity of the past.

BUILDINGS, PARKS AND INSTITUTIONS. The parliament and departmental buildings are the most conspicuous structures in

the city, though rivaling them in attractiveness are the Roman Catholic cathedral, Anglican cathedral, Church of Notre Dame des Victories, Jewish synagogue, Clarendon, King Edward, Chateau Frontenac and other hotels, and a few modern office buildings.

One of the most attractive spots in the city is the promenade known as Dufferin Terrace that runs across the bluff at a height of 200 feet above the river. At the eastern end of the 1,400 promenade is a statue of Champlain. Overlooking the St. Lawrence is the Governor's Garden, a beautiful spot, in which stands a monument to Wolfe and Montcalm.

The educational and other institutions of Quebec are many. The city is the seat of the Université de Montreal (formerly Laval University), one of the largest Roman Catholic educational institutions in Canada. Laval Normal and Model School, a high school, the Convent of the Good Shepherd, a large public library, the Canadian Institute, Advocates' and Parliamentary libraries and the Geographical Society are also important. There are several public and private charitable institutions in the city.

COMMERCE AND INDUSTRY. In Quebec harbor the largest ocean and river craft can anchor; the water is 40 feet deep at low tide, and all equipment to facilitate loading and unloading has been installed. Docks and warehouses are adequate, and there are two grain elevators with capacities of 250,000 and 2,000,000 bushels respectively.

At the last industrial census Quebec had almost 400 industrial establishments, the value of whose products was $33,126,000. Boots, shoes, leather, brewery products, boilers, machinery, iron and steel, printed matter and finished lumber are the leading commodities.

HISTORY. Jacques Cartier took possession of the site of Quebec for France in 1535. The first settlement was made by Champlain in 1608, and until Canada passed to England in 1763, Quebec was the French stronghold in North America. In 1775 the Americans made an unsuccessful effort to storm the city. During 1851-55 and again in 1859-65 Quebec was the capital of the Province of Canada under the Act of Union, and in the old Parliament House the famous confederation debate was held in 1864. Population, 1921, 114,550. See CANADA, subtitle *History;* QUEBEC, PROVINCE OF, subtitle *History;* QUEBEC, BATTLE OF; WOLFE; MONTCALM; CARTIER; MONTGOMERY.

Quebec Act, the act of the Parliament passed in 1774, that provided a government for the Province of Canada, which was acquired from France by the Treaty of Paris of 1763. Quebec Province, while belonging to Great Britain, had a large French population, and the framers of the act attempted the difficult task of pleasing with the same laws two peoples whose religion, ethics, culture, language and customs were markedly different.

Three features of the Act caused trouble in the province; these were: (1) the extension of the boundaries of Quebec so as to include all the land northwest of the Ohio River and east of the Mississippi; this was obnoxious to the colonies east of the Alleghanies, who claimed territory farther west than those mountains. (2) The substitution of French for English civil law in Quebec Province. (3) The withholding of the privilege of responsible and representative government.

Great indignation was excited among the English speaking people of the American colonies and among the home population. The framers of the Act pleaded the necessity of annexing the territory to some civil government because of the anarchy that obtained there. For the establishment of French civil law the reason given was that the population was so predominantly French that French civil law was really in effect in the province, and that the Act but legalized that which already existed. Representative institutions were withheld on the ground that, because of religious differences, representation would simply mean that one or the other of two religious bodies would always be in power, and that representation would mean, finally, only partial representation. Because the English speaking colonists considered the Act as a blow aimed directly and deliberately at them, it

was a potent cause of the American Revolution.

Quebec, Battle Of the historic contest decided on the Plains of Abraham on September 13, 1759, was the pivotal event in the history of North America, for it put an end to the long struggle for dominance between France and England. In the year 1759 it was decided in England that the time had come for a final trial of the English against the French in North America; and since what is now southeastern Canada was the French stronghold and Quebec the center of influence, it was inevitable that the last great battle should be fought in this region. Accordingly, two armies were sent out; one under Amherst was to capture Fort Ticonderoga and Montreal; the other under Wolfe was to ascend the St. Lawrence and take Quebec.

The French considered the fortress of Quebec impregnable, because of its position on a high, steep promontory and because of the almost unscalable cliffs that extend along the river on the Quebec side for several miles above and below the city. These heights were manned by Montcalm's best soldiers. Four miles below Quebec is the island of Orleans, and on this Wolfe landed his army of 9,000 picked men. Sending a small force to Point Levis, opposite the citadel, Wolfe ordered the bombardment from the Point and from the island. This was so successful that the inhabitants of the city were soon in a panic. On the 31st of June, Wolfe made an unsuccessful attack on Beauport. It was then that Wolfe laid his plan for a night ascent of the cliffs, to be followed the next day by an attack on Montcalm from the rear.

Under cover of darkness and as silently as possible, Wolfe's army crossed the river, scaled the cliff, and drew up in battle array on the Plains of Abraham on the following morning. Though highly surprised, the French drew up to face the English; the French advanced to within forty paces of Wolfe's determined forces, but the first English volley had such a deadly effect that the defenders were put to rout beyond the possibility of reconcentration. Wolfe and Montcalm both fell dead, and in a few days the city was formally surrendered to Wolfe's successor, General Townsend.

By the Treaty of Paris of 1763 all the French Canadian possessions were ceded to Great Britain. The battlefield on which the basis of this treaty was laid, together with the battlefield of Saint Foy, was converted into a national park under the title of Battlefields National Park in 1908. See MONTCALM, LOUIS JOSEPH; WOLFE, JAMES; PARIS, TREATIES OF; QUEBEC, CITY OF.

Quebracho, kā-brä′chō, a hardwood tree of South America. There are three species. Two, the red and the white, are of commercial importance. They grow in Brazil, Paraguay, and Argentina. The wood is close-grained and hard. The name is Portuguese for break-hatchet. The wood is durable and is in use both in South America and in Europe for railroad ties. Numerous sawmills on the La Plata and its branches are engaged in sawing quebracho. American sawmills and American methods are in use. The growing trees are scattered four or five to the acre. One firm has a concession of 4,000,000 acres, and is turning out 20,000 ties a week. Quebracho forests are quoted at $3,000 per square league of about 4,400 acres. A quebracho mill and extract plant costs about $240,000. A drug is extracted from the white quebracho which is used for bronchial diseases. Both the red and the white species yield an extract of tannin in demand for tanning and dressing morocco and other fine leathers. To obtain the extract, the entire trunk or else slabs from the sawmills are run through planers and are converted into shavings or chip dust. The shavings are treated with chemicals and are boiled in vats until the tannin is removed. The extract is boiled down into a jelly which is poured into sacks and dried for shipment abroad. The valley of the La Plata shipped 60,000,000 pounds of the quebracho extract in 1908, sixty-five per cent of which was exported to the United States.

Queen's College. See KINGSTON.

Queenston Heights, Battle Of, a minor engagement of the War of 1812 but the one that marked the end of the first attempted American invasion of Canada, was fought at Queenston Heights, seven miles below Niagara Falls, October 13,

1812. General Brock, commanding a British force, had taken Detroit and was engaged in the defense of the Niagara frontier; his 1,500 men were covering a line 36 miles long. The American force, under generals Smyth and Van Rensselaer, began to cross the Niagara River from a point opposite Queenston Heights; after 400 men had made the crossing the British, led by Brock in person, attacked. Brock fell, mortally wounded, and the Americans remained in possession of the heights for some hours. Near the close of the day, each side having been reinforced, the British in a surprise attack routed the Americans and took about 900 prisoners. On the battlefield now stands a monument to General Brock, one of the most courageous and able men in either army.

Queenstown. See CORK.

Queue, the style of hairdressing peculiar until recently to Chinese men. The hair was shaved except for a small spot on the top of the crown where it was allowed to grow and hang in a long, black braid. The care of the queue was as important a part of a Chinese dandy's toilet as the crease in the American's trousers, and for a boy to grow up without a luxuriant head of hair from which to make a long, thick queue was regarded a misfortune. This pride in the queue was rather a curious thing, for about 250 years ago, when the present Manchu dynasty conquered China, the new rulers compelled Chinese men to shave their heads in that fashion as a sign of loyalty to the new rule. Many Chinese felt the indignity so keenly that rather than bear the disgrace of it they chose to lose their heads. The Manchus, however, behaved so diplomatically that this feeling of humiliation gradually changed to one of pride in the queue, and for many years a Chinaman without this appendage was known to be badly disgraced. To see one on the streets of another country minus his queue was an indication that he had given up forever returning to his home country. But the last fifteen years have been years of a great awakening in China, and when people realized the inconvenience of the queue the bolder of them removed theirs. The government offered no objection and the custom spread somewhat; finally in 1910 the emperor yielded to the insistent demands of his counselors and issued an edict formally sanctioning its removal. Today a Chinaman may wear it or not as he chooses; the members of the emperor's household have discarded it entirely. See CHINA.

Quicksand, a tract of loose or moving sand too unstable to support heavy bodies. Areas of it occur on flat sea coasts and at the mouths of rivers. In appearance, though heavily saturated with water, they do not differ from neighboring sands. The impervious layer of clay on which the sands rest prevents the water that comes from river currents, tides, and sea currents from running off. This continued collection of water makes a compact surface impossible, and in this way the quicksands differ from ordinary sands which are hardened by pressure. In 1875 a locomotive and train at Pueblo, Colorado, sank in a bed of quicksand to a depth exceeding fifty feet and was never recovered. The dangers, however, have been exaggerated, for quicksands do not exist to any wide extent. In Scott's *Bride of Lammermoor,* in Wilkie Collins' *Moonstone,* and in Hugo's *Toilers of the Sea,* are given highly colored and vivid accounts of the perils of quicksand.

Quicksilver. See MERCURY.

Quigley, James Edward (1854-1915), an American Roman Catholic prelate. He was born in Oshawa, Ontario, Canada, was graduated from Saint Joseph's College, Buffalo, and studied theology in the Vicentian Seminary, Niagara, New York, in the University of Innsbruck, Austria, and at the Propaganda, Rome. He was ordained priest in 1879, returned to the United States and became pastor of the church in Attica, New York, and was appointed rector of the Cathedral of Buffalo, in 1884. In 1897 he was made bishop in Buffalo, and in 1903 was promoted to archbishop, taking charge of the archiepiscopal see of Chicago, his diocese including a population of over one million Catholics. In 1904 he was arbitrator in the Buffalo labor strike.

Quiller-Couch, kwĭl'er-kowch, **Arthur**

(1863-), an English author. He was born at Cornwall, and was educated at Oxford. In 1887 he began his literary career in London, becoming a member of the staff of the *Speaker,* a liberal weekly. He used the pseudonym "Io" for some years. He has written many novels, short stories, and poems. He drew largely on Cornwall for local color. Among his books may be named *The Laird's Luck, Old Fires and Profitable Ghosts, The White Wolf, Hatty Wesley,* and *The Ship of Stars.*

Quilt, the topmost cover for a bed. Quilts are also called coverlets, counterpanes, and bedspreads. They are of various kinds. The common domestic method of making quilts is to stitch together with the needle two pieces of fabric of the required size, with an even layer of cotton batting or wool between them. The stitching is in some regular pattern. The upper covering of the quilt is usually more or less ornamental. Patchwork of various patterns has been, and in some localities is still, a popular method of making this upper covering of the quilt. Crochet, toilet, and Marseilles quilts are loom woven. They are made of heavy cotton yarns and ornamented with a variety of patterns by means of the Jacquard attachment. They are woven double, and the crochet quilts are reversible. Marseilles quilts have a much coarser back and cannot well be reversed.

Quince, the name of a large shrub or a small, very crooked tree of the rose family, allied to the apple and the pear. The flower and the fruit, also called quince, resemble those of the apple and the pear in shape and size. An exception is that the terminal flowers appear singly.

The quince is native to Asia, where it was cultivated more than 2,000 years ago; and because it cannot be eaten raw except after frost and for the reason that its uses are resricted to jelly making and preserving, but little attempt has ever been made to vary it, the fruit of today being much like that which the ancients knew.

In the United States this fruit may be raised as far north as New York, and the most valuable quince orchards are in the western part of that state. The shrubs are propagated from cuttings and must be carefully tended, as they are subject to attack by several diseases and parasites.

Quincy, a prominent name in American biography. Edmund Quincy, a lawyer of note, was born at Braintree, now Quincy, Massachusetts, in 1681. His grandson, John Quincy, lived 1744-1775. He was born at Boston and undertook the profession of law. He took a prominent part in the agitation which preceded the American Revolution and died while absent on a political mission to England. His son, Josiah Quincy, lived 1772-1864. He represented Massachusetts in Congress 1805-13. He opposed the War of 1812 and was against the admission of Louisiana. He was mayor of Boston, and from 1829 to 1845 was president of Harvard. He wrote a *History of Harvard University* and a *Municipal History of Boston.* His son, Edmund Quincy, lived 1808-1877. He is known chiefly as his father's biographer and the editor of his writings. Josiah Quincy, a brother of the preceding, was mayor of Boston in 1845-9; another Josiah Quincy has been prominent in the politics of Massachusetts. Other Quincys are still prominent in the politics of Boston and of the state. Quincy, Massachusetts, was named after John Quincy of this family in 1792. It is a suburb of Boston, noted as the birthplace of John Quincy Adams and John Hancock. It has enormous stone quarries and is noted for its system of public schools.

Quincy, Ill., an industrial city and the county seat of Adams County, is also one of the oldest cities in the state. It is situated on high bluffs along a bend in the Mississippi River and is 263 miles southwest of Chicago. Railroad transportation is provided by the Wabash, Chicago, Burlington & Quincy and Quincy, Omaha & Kansas City lines.

Quincy is the commercial center of a fertile agricultural region, its trade life is important, and its manufactories produce more than 500 different commodities. Important among the latter are flour, plows, structural steel, elevators, stoves, show cases, drugs and chemicals, shoes, paper, envelopes, paper boxes, engine governors, air compressors, incubators, optical goods and strawboard.

Notable features are the Illinois Soldiers' and Sailors' Home, Quincy Historical Society, Gem City Business College, Quincy College, Chaddock Boys' School, St. Mary's Institute, city and county buildings, Federal building, public library, Indian Mounds, South, Riverside, Madison and other parks, Woodland Orphans' Home and a state armory.

Quincy was settled in 1821, incorporated in 1834, and chartered as a city in 1839. it was an important settlement in the early history of Illinois and was the scene of one of the famous Lincoln-Douglas debates. In 1920 the inhabitants numbered 35,978.

Quincy, Mass., a city in Norfolk County, is composed of a number of villages. On the north the Neponset River divides it from Boston, the Fore River, to the south, separating it from Weymouth. The New York, New Haven & Hartford Railroad and several electric interurban lines enter the city. Its area is about sixteen and a half square miles. There are several fine parks in the city, modern public buildings and two private schools for girls. The industries include granite-quarrying, shipbuilding and the manufacturing of yachts, brass goods and foundry products.

Quincy was settled in 1625, and was then known as Mount Wollaston. It was incorporated in 1792 and named in honor of John Quincy, becoming a city in 1888. Population, 1920, 47,876.

Quinine, kwī′nīn, or Peruvian bark, a white crystalline salt obtained from the bark of several South American cinchonas (sĭn-kō′nas). The various species are shrubs or little trees found in the Andean region. The pink and white flowers are fragrant and have deep tubular corollas. They are much frequented by humming birds. The extract is without color or odor, but is exceedingly bitter. It has been known since 1640 as a remedy for fever and colds. It was introduced by the Jesuits and was known at first as Jesuit powder. The discovery of quinine marks the beginning of modern medicine, *i. e.,* of remedies that kill germs and of preventive medicine. The government of India deemed a ready and cheap supply of quinine of such importance to the natives in fever-stricken districts that large sums of money were spent in efforts, finally successful, to transplant cinchona plants from the Andes. A five-grain capsule may now be had at any postoffice in British India for a native coin worth a cent and a half. The production of quinine is now well established in Ceylon, Dutch Java, and Jamaica. Sometimes the twigs are gathered, sometimes the tree is cut down, and sometimes the bark is removed in strips. When covered with moss the bare places heal quickly with bark as rich as ever, and the tree continues to produce indefinitely. About nine-tenths of the world's supply of quinine is now marketed at Batavia, the emporium of Java. Quinine auctions are held. The drug fetches from $2.50 to $4 a pound. An extract of willow is a substitute for quinine. See CINCHONA; MALARIA.

Quinsy, acute inflammation of the tonsils, often resulting in the formation of ulcers or abcesses. The symptoms of the disease are a chill, followed by fever, headache, and a swelling of the tonsils. The patient frequently has annual or recurring attacks which are almost invariably on but one side. Quinsy develops into resolution or suppuration. Suppuration causes great discomfort but is rarely fatal unless the abcesses open during sleep when the air passage may be obstructed or hemorrhage set in from the carotid artery. In resolution, the pain and inflammation diminish after four or five days. Children and old people are not as a rule susceptible to attacks of this disease. Milder attacks are commonly known as tonsilitis. In permanent or oft recurring enlargement of the tonsils, the best treatment is their removal by a physician.

Quintilian, Marcus, Fabius (35-100)?, a Roman rhetorician and critic. He was born at Calagurris, Spain. He received his education in Rome and practiced as an advocate, but distinguished himself as a teacher of rhetoric. He was given consular rank by Domitian. His chief work, *Institutio Oratoria,* in twelve volumes, presents his theory of education and discusses literature, oratory, and rhetoric in a broad, sound, and practical way.

Quito, kē′tō, the capital city of Ecuador. The name is Indian, signifying deep ravine. Quito is situated on a plateau of the Andes 9,350 feet above the sea. Although it lacks but fifteen miles of being situated directly under the equator, the altitude is such that the climate is spring-like and agreeable. Cotopaxi and other volcanoes and lofty peaks in the immediate vicinity form a circle about the city. The region is subject to earthquakes. The buildings are, for that reason, low and substantial. No provision is made for heating. A railroad has of late been constructed to the port of Guayaquil, 165 miles distant; but Quito is as yet little known. There is a university with thirty-two instructors and 216 students. The latest estimate gives the population as 70,000. The people are, almost without exception, Spanish or Indian. The city lacks hotels and paving, but is lighted with electricity. Water is supplied by public fountains fed by open ditches from the mountains. Other municipal improvements are under way. The young women are famous makers of gold lace. The art was introduced by Spanish nuns. The establishments of the Catholic church are numerous. There are six monasteries, seven convents, two seminaries, seven parish churches, fifteen convent churches, a cathedral, a basilica, and thirteen chapels, in all covering a fourth of the city area. A consul-general has said of this city:

> Quito is noted for the large amount of religious painting and sculpture done within its limits and exported to adjacent countries. Laces and embroideries are also made. Other important industries are the carving and coloring of small figures from vegetable ivory, and the drying of bird skins, particularly the skins of humming birds brought from the Napo River by the Indians.
>
> Manufacturing interests are represented by seven flour mills, one foundry, one ice factory, and two sugar refineries. Shoes are made by hand. There are also establishments engaged in making woolen and cotton blankets, ponchos, baize, common carpets, matting, Indian felt hats, furniture, pottery, saddles, wagons, carts, adobe, hard and soft brick, roofing tiles, chocolate, cheese, and candles.

Quoits, a game played by pitching rings at a pin or hob driven into the ground. The rings are usually sharp on the outer edge so that they may cut into the turf or earth and stay in place. The quoit that lodges and lies nearest the hob counts one for its owner. Two pegs are driven into the turf at a distance of thirty to sixty feet apart. Two quoits are pitched by the first player, then two by the second. If both quoits of either player lie nearer the peg than either of his opponent's quoits, he scores two. A quoit that rests on edge, one edge on the turf and the other against the hob counts two for its owner. A quoit that encircles the stake counts three. Ten is usually a game. In pitching a player must stand with one foot against a hob. Two players cast their quoits, then walk to the other hob and pitch them back again. Four players pitch to better advantage. Two pitch from one end of the ground. Their partners settle the count at the other end and pitch the quoits back again. Horseshoes make an excellent substitute for quoits. In pitching the player holds the shoe in one hand and aims to deliver it with a twirling motion that will lodge the shoe in a flat position, corks downward. It is the position which is finally occupied, not the place of striking, that counts.

Quorum, a term applied to the number of persons required to be present for the transaction of business. The number is variable or determined by the constitution or by-laws of the assembly. In the United States Congress a quorum is a majority of all the members. In the British House of Commons it is forty members, and in the House of Lords three members.

R

Rab and His Friends, a story published in 1859 by John Brown (1810-1882), a Scottish physician of Edinburgh. Rab is a faithful dog whose master and mistress, the "Friends" of the title, are a Howgate carrier and his wife. Rab is one of the most famous dog characters in literature.

Rabbit, a prominent member of the hare family. The difference between the hare and the rabbit is not well understood in America. While there are many points of resemblance the distinction is, after all, not a difficult one. The rabbit is a short-legged animal. It never depends upon its fleetness. Instead of coursing away before the hounds it takes refuge in a burrow as promptly as a chipmunk. The rabbit is an adept in excavating underground passages which are oftentimes extensive. A set of galleries is called a rabbit warren. It usually accommodates a considerable colony of these timid animals. The fur of the rabbit is soft and fine. It has been used not a little as a substitute for beaver in the manufacture of hats. The winter coat makes a passable substitute for genuine ermine. Like the hare, the rabbit lives exclusively on vegetable food, being fond of clover, cabbage, lettuce, and the bark of various shrubs and trees. The tame rabbit of Europe is well known in America. It is said to have been domesticated originally from North Africa. Rabbits multiply with amazing rapidity. They begin to breed when six months old. There are from four to twelve young at a litter, and several litters are produced in a year. The young are almost naked at birth and are blind as kittens for several days.

Rabbits were introduced from England into Australia some years ago. With an abundance of food and freedom from the persecution of natural enemies, they have spread over the country in such prodigious numbers as to threaten agriculture and sheep pasturage seriously. The province of New South Wales has erected thousands of miles of woven wire fence in order to exclude these destructive animals from the choice farming regions. In 1920 $7,000,000 Australian rabbits were frozen and shipped to England in refrigerator ships. For an account of American rabbits the reader may turn to an article on the HARE. All our American species are hares. The Belgian hare is a genuine rabbit. It may not be out of place to say that Welsh rabbit is a term applied to a dish consisting of melted cheese and ale poured on toast, for which the term rarebit is sometimes erroneously substituted.

See HARE.

Rabelais, räb-e-lā′, **François,** a French writer of the sixteenth century. He is thought to have lived 1483-1553. He was by turns a Franciscan monk, a Benedictine monk, an ordinary priest, a medical student, and a practicing physician. He is noted as the author of *Gargantua* and *Pantagruel,* a work descriptive of the education and lives of a supposed father and son. The pretended biographical feature serves as an excuse on which to string a medley of jokes, witticisms, bits of description, serious dissertations on education, marriage, and social instruction in general, all in a vein of exaggeration, reminding the reader of *Don Quixote.* The work appeared from time to time by books. Lyons and Paris were the principal places of publication. Rabelais' writings were frowned upon by the church and by the leaders of society, but had an immense sale. He himself boasted that more copies were sold in two months than of the Bible in nine years. Although his writings now seem tedious and coarse beyond description, sixty editions were published within a comparatively short period of time. Numerous versions appeared in English, French, Italian, and other European languages. Rabelais was a noted Greek and Latin student. He was indebted, of course, to all literature that preceded him; nevertheless, his writings are a mine of words and phrases in which even Shakespeare did not hesitate to delve. He has been variously called the apostle of sound education, the wicked Rabelais, the atheist, the greatest wit of Europe, a dirty old blackguard, a thinker and

preacher, etc. Lord Bacon called him "the great jester of France." Rabelais coined or at least gave currency to many phrases, such as:

To leap into the dark.
Rob Peter to pay Paul.
Merry as crickets.
The sinews of war.
Feather one's nest.
A flea in the ear.
To hit the nail on the head.
Save your bacon.
Plain as the nose on a man's face.
Hearts of oak.
Thereby hangs a tale.
Other fish to fry.
Spare your breath to cool your porridge.
Three bites of a cherry.
Done to a T.

The Devil was sick,—the Devil a monk would be;
The Devil was well,—the Devil a monk was he.

Rabies, rā′bĭ-ēz, an infectious disease of man and many other animals. It is a well accepted theory of medicine that a number of diseases such as typhoid, yellow fever, smallpox, cholera, and measles are caused by the presence in the system of colonies of bacteria, for the nature of which the reader is referred to the article on BACTERIUM. Recent investigations have added rabies to this list of diseases. The bacteria of rabies flourish only in animals, chiefly in the brain, spinal chord, nerve trunks, and the salivary glands. An animal cannot have rabies without receiving bacteria from some afflicted animal. This is most likely to happen when an animal with rabies bites another, in which case, bacteria-laden saliva becomes mixed with the blood of the victim. In the case of a person thus bitten, unfavorable symptoms are not likely to appear for the next three or six months and sometimes longer; that is to say, the bacteria require that time to increase sufficiently in numbers to affect the brain. The outbreak usually begins with restlessness, headache, and difficulty in swallowing. Two or three days later twitchings of the muscles and convulsions are succeeded by an increase in the pulse rate and a rise of temperature. Then comes delirium, followed by paralysis and death. Few recover after the disease has reached a malignant stage. One hundred and forty-three deaths of persons are reported in the United States for the year ending May 31, 1890.

Both men and animals afflicted with rabies dread the appearance of water or any other liquid; hence the term, hydrophobia, or water-fear. Rabies develops in some animals, particularly rabbits, inside of a week. If it is suspected that a patient is afflicted with hydrophobia, a test is made by injecting blood from his body into that of several rabbits. If none of them go mad within ten days, the presumption is that the patient does not have hydrophobia; if, on the contrary, the rabbits develop the disease, heroic measures must be taken at once. A course of treatment discovered by Louis Pasteur, an eminent scientist of France, has been widely advertised as pasteurism. Taking a hint from the treatment of smallpox by inoculation, Dr. Pasteur inoculated patients with rabies virus from rabbits. He prepared a series of inoculating material from the nerve chord of a rabbit. The first injection was exceedingly weak, merely a trace. As soon as the lymph had killed off these germs, that is to say, as soon as the patient's system had withstood this inoculation, he made another, a little stronger, and later, another stronger again, until before the time had arrived when the patient would naturally have gone mad, his system had become accustomed to rabies virus of full strength. It is claimed that, out of hundreds of cases, this famous man has not lost a patient that began to take treatment within a reasonable length of time after being bitten. Similar institutes have been established in various large cities.

The disease was described by Aristotle. It appears to have undergone no material change for 2,000 years. It takes two forms. An animal affected with the more virulent rabies snaps and bites in a rage at whatever or whoever comes in the way. The milder type, or dumb rabies, as it is called, is accompanied by a dropping of the jaw, melancholy, and extreme dejection, without any desire to attack others. Sheep, horses, cattle, dogs, wolves, foxes, rabbits, chickens, probably all warm-blooded animals, are subject to rabies, but it is most dangerous in the case of a dog, from the tendency which a mad dog has to spring at anyone within reach.

There is a foolish notion not yet entirely

eradicated that a dog who has bitten a person should be killed, lest the person go mad. A dog cannot communicate hydrophobia unless the bacteria be in its own blood and saliva at the time of the biting. The fact that the dog may subsequently have rabies and go mad does not endanger a person bitten before the dog was infected. The bite of a person or of any animal afflicted with rabies is just as dangerous as that of a dog.

Raccoon, an American flesh-eating animal. The raccoon belongs to a class of animals halfway between the bear and the dog. Early naturalists, in fact, considered the raccoon a sort of bear from the way he walks on the last joint of his legs. The common raccoon is found in timbered regions from Hudson Bay to Louisiana, except where he has been exterminated by settlers. The raccoon is usually spoken of as masculine. He is twenty-six inches long. His tail measures eight inches. He weighs from twenty to twenty-five pounds. His head is round, with a sharp, delicate nose, and a cunning, sly, foxy face. He is considered as cunning as a fox, as meddlesome as a monkey, as greedy as a bear, and as sly as a cat. He has long legs with strong claws, and is famous as a tree climber. The raccoon is partial to forests on marshy ground or along streams. His favorite food consists of eggs, frogs, mussels, turtles, and any small animal that he can catch. He is addicted to robbing birds' nests whether in trees or along the water's edge like those of the duck or goose. The raccoon is fond of staying in the water—not swimming but paddling. He likes to soak his food before eating. "Coons," although flesh-eaters, are fond of corn and do great damage to cornfields. Hunters go out at night with lanterns, dogs, and guns along the edges of their corn fields. The dogs chase the "coon" out of the fields and tree him, keeping up a loud baying until the hunters come and either chop down the tree so that the dogs can catch the coon, or shoot him as he sits above in the branches. A roasted coon is considered a great delicacy. Coon skins, if taken in the winter season, are much prized for sleigh robes and overcoats. A coon-skin cap is traditional. The coon's pelt is the only one in the market having tail with black and gray rings.

In northern climates the coon family retires into a hollow tree and sleeps through the winter; but in the south they are active the year around. The nest of a coon is made usually in the hollow of a tree. From four to six young, half the size of a rat, are produced at a time. Coons are easily tamed, and are amusing, but exceedingly troublesome about a house. They are greedy and inquisitive, and must be kept chained. A crab-eating raccoon, with the general habits of the animal we have just described, is found in South America and along our Pacific coast as far north as California. It is fond of fish and sugar cane.

Races of Men, narrowly, the different peoples now inhabiting the earth; more broadly, and for the general reader less interestingly, the living inhabitants of the earth and their progenitors of tens of thousands of years ago. Two views of man's origin are held in the civilized world. First and oldest is the view set forth in *Genesis,* the first book of the Old Testament; second, and dating from the publication of Darwin's *Origin of Species* and *Descent of Man,* in the second half of the nineteenth century, is the evolutionary view. In essence, the evolutionary theory is that man sprang from the order of primates, to which the higher apes belong. By many who are unacquainted with the literature of evolution in general and the writings of Darwin in particular, is is supposed that the evolutionary theory is that man descended from the higher apes. No notion could be more false, for even superficial observation shows that man has ascended, and not descended.

The causes of the variations to be observed in the different races of men are too numerous—and in many instances too uncertain—to be gone into in a general article; but the simplest and at the same time most general cause is the variability that obtains in the whole of organic nature and must have been noticed by any one who has raised flowers, birds or animals. As it applies to man, this variability is caused by such things as climate, nutrition, natural or sexual selection, social status—in a word, by environment.

In nearly a century of scientific attempts at the classification of man by races much

valuable work has been done; and though there is still disagreement as to how the human family should be divided and even as to just what constitutes a "race," the questions are nearer solution today than they were a half a century ago.

Almost every one is familiar with the old division of mankind according to skin pigment into Caucasian (white), Mongolian (yellow) and Ethiopian (black) races. The most modern method of judging any individual's racial status is to consider: the form of the hair (i. e., whether circular or elliptical, straight, curly or wooly); skin, hair and iris pigmentation; form, size, texture and capacity of the skull, with measurements of the face; total size of the body and comparative sizes of bodily parts; definite characteristics of the nose, lips, ears, etc; and the characteristics of the soft parts of the body—muscles, nerves, etc.

Upon the basis of the criteria enumerated above, Denikir compiled the following table of 29 races:

1. Wooly Hair, Broad Nose
   1. Bushmen
   2. Negrito
   3. Negro
   4. Melanesian
2. Curly or Wavy Hair
   5. Ethopian
   6. Australian
   7. Dravidian
   8. Assyroid
3. Wavy Brown or Black Hair, Dark Eyes
   9. Indo-Afghan
   10. Arab or Semite
   11. Berber
   12. Littoral European
   13. Ibero-Insular
   14. Western European
   15. Adriatic
4. Fair, Wavy or Straight Hair, Light Eyes
   16. Northern European
   17. Eastern European
5. Straight or Wavy Hair, Dark, Black Eyes
   18. Ainu
   19. Polynesian
   20. Indonesian
   21. South American
6. Straight Hair
   22. North American
   23. Central American
   24. Patagonian
   25. Eskimo
   26. Lapp
   27. Ugrian
   28. Turkish or Turko-Tartar
   29. Mongol.

The reader will find interesting supplementary data on this subject under the articles Anthropology; Geology; Astronomy; Sociology; Europe; Asia; Africa; Population.

Rachel, rä′shĕl, (1821-1858), a Jewish actress whose real name was Elisa Rachel Félix. She was born in Switzerland. Her father was a German Jew, who finally settled his family in Lyons, France. There Rachel and her older sister begged in the streets to help swell the scanty revenues of the family. In 1830 they removed to Paris, where the two girls sang on street corners. A vocal teacher became interested in them, and as a result Rachel was trained to become an actress. From 1837 till her death she played tragic parts in French classic drama, winning special praise as Camille and Phèdre. She visited England and America, as well as leading cities on the Continent, scoring almost universal success, though she had great difficulty with the English language. She died as the result of a heavy cold caught on her American tour.

Racine, rä-sēn′, **Jean Baptiste** (1639-1699), a French poet, regarded by many as the greatest tragic dramatist of France. He was born at La Ferté Milon. He was early left an orphan and was brought up by his grandparents. He was educated at the College de Beauvais, a grammar school in the town of that name, at Port Royal, and at the College d'Harcourt. At Port Royal he received thorough training in the classics, and from the first his tastes seemed to lie wholly in the direction of literature. He showed talents which won the admiration of his instructors, but which, coupled with his love of poetry and his dislike for anything that savored of asceticism, caused the good friends of the abbey to feel anxiety for his future. His first reputation was won by an ode for the marriage of Louis XIV, entitled *Les Nymphes de la Seine.* For this he received a small pension, and for some time after leaving the College d'Harcourt he led a somewhat loose and reckless life. He was induced finally to attempt the study of theology with an uncle. This was an utter failure, and in 1662 the young man returned to Paris and began to devote himself to dramatic literature.

Racine's first dramas seem to have been feeble imitations of Corneille, who advised him to attempt no more tragedy. Racine paid no heed to this advice, and in 1667 *Andromaque* appeared and produced a powerful effect. "The poet had discovered," Botta tells us, "that sympathy was a more powerful source of tragic effect than admiration, and he accordingly employed the powers of his genius in a truthful expression of feeling and character, and a thrilling alternation of hope and fear, anger and pity." For several years Racine's productions followed each other rapidly. At the suggestion of Henrietta of England, Corneille and Racine, each unknown to the other, wrote a tragedy on the subject of *Berenice*. Corneille failed; Racine was successful.

Phèdre was the last and the best of Racine's regular tragedies. It was presented in 1677. The poet's enemies arranged for a rival, Pradon, to write on the same subject. Racine's friends rallied to his support, but his enemies were powerful. Doubtless both factions resorted to all sorts of tricks and intrigues. The opposition *Phèdre* won. It was a great success, while Racine's *Phèdre*, "the finest tragedy of the French classical stage," was a total failure.

Partly on account of this failure, partly from religious scruples, Racine now abandoned dramatic writing for almost twelve years. He intended to become a monk, the effect of his early religious training leading him, evidently, to seek in a life of devotion consolation for his disappointments and balm for his remorse. He was persuaded, however, to abandon this purpose and, instead, to marry a devout woman and let the quiet of a domestic life suffice instead of the privations and severities of the cloister. He was soon after appointed historiographer to the king, conjointly with Boileau.

He now pursued a most regular and exemplary life—giving one-third of each day to religion, one-third to the king, and one-third to his family and friends. In 1690 he was induced to produce a drama for the pupils in the Maison de St. Cyr. *Esther* was the result and, though acted by school girls, it met with immense success. The next year, he produced *Athalie*, but, as the school had given up theatricals, this work was published. It found few readers, but is regarded at the present day as one of Racine's finest dramas. Racine was the author of many odes, epigrams, and songs. He wrote prose as well as verse.

SAYINGS.

Extreme justice is often injustice.
I fear God and I have no other fear.
He who will travel far spares his steed.
Let us do what honor demands.
Innocence has nothing to dread.
A single word often betrays a great design.

CRITICISMS.

The tragedies of Racine are more elegant than those of Corneille though less bold and striking. Corneille's principal characters are heroes and heroines thrown into situations of extremity, and displaying strength of mind superior to their position. Racine's characters are men, not heroes,—men such as they are, not such as they might possibly be.—Botta.

In the eyes of his countrymen, Racine is the most perfect, if not the most sublime, of all their dramatists. Corneille may at times exhibit a grander and more rugged energy, but in beauty, grace, and a certain tender majesty of style, Racine is held to be without a rival; and it must be remembered that style, and not portraiture of human character, is the thing in which French dramatists aim to shine. The declamations in which the heroes and heroines of Racine indulge are marvellously fine pieces of rhetoric; but, compared with the Elizabethan drama, they are deficient in deep insight into human nature and in genuine passion, while humor is altogether excluded.—Chambers.

Of the whole world which is subject to the poet, he took only a narrow artificial and conventional fraction. Within these narrow bounds, he did work which no admirer of literary craftsmanship can regard without admiration. But at the same time no one speaking with competence can deny that the bounds are narrow.—Britannica.

Racine, a city in southeastern Wisconsin on Lake Michigan. It lies between Milwaukee and Chicago, on two important railroads, and is an important manufacturing and shipping center. The harbor is one of the best on the lakes, and is visited by vessels from all the other lake ports of importance. Some of the chief manufactured products are knit goods, machinery, hosiery, flour, lumber, carriages, foundry products, shoes, leather, steel springs, trunks and valises, furniture, woolens, and beer. Notable buildings are the city, county and federal buildings, Saint Luke's Hospital, Saint Mary's Hospital, an orphan

asylum, the Y. M. C. A. building, and a Dominican convent. In 1920 the population was 58,593.

Rack, an instrument of torture used in the Middle Ages to extort a confession or a promise. It consisted of a wooden frame somewhat longer than a bedstead with a roller at each end. The victim of torture was laid on his back on this frame, the ankles were tied by a cord to one roller and the wrists to the other. By turning the rollers with pins or handspikes and winding up the cords, the victim's body would be lifted and his limbs could be stretched beyond endurance, even to tearing them out of their sockets. A twinge or two of such mortal agony would extort the hiding place of treasure, wife, or child, or secure the assent to any statement the persecutor might desire to place in his mouth. Civilized nations wisely forbid the use of torture even to get at the secrets of the vilest offenders. In fact, in English-speaking countries, the law does not compel one to testify against himself or a wife against her husband.

Radcliffe College. See HARVARD.

Radiation, a term used in physics for the emission of energy from some source, either in the form of ether waves, actual moving particles, or the energy of their motion. The first is the most usual form, and includes the shorter waves, having chemical effects only; then those affecting the eye, or light; the longer ones known as radiant heat; and the very long electromagnetic waves, such as affect the wireless telegraph receiver. In addition to radiation by wave motion, there is the X-ray type, probably not a wave but a mere impulse; and the radiation from the radioactive substances made up of actual material particles.

Radiation as a means of transmission is extensively used in artificial heating. See HEATING AND VENTILATION.

Radiator. See HEATING AND VENTILATION.

Radio, a term now generally applied to wireless communication by electro-magnetic waves, but at present applied to telephony when the term is not otherwise qualified. The same process is used in the wireless telegraph and the wireless telephone, and the same principles underlie both means of communication. The difference consists in the apparatus used for transmitting and receiving the waves. The apparatus in each case being adapted to the methods used. See WIRELESS TELEGRAPHY.

UNDERLYING PRINCIPLES. Electro-magnetic waves travel through space like ripples on the surface of the water when a stone is thrown into it, except that they radiate from the center of a sphere instead of the center of a circle. These waves are of different length according to the force which gives rise to them. The stronger the force the longer and larger the waves. They extend with equal velocity in all directions from the center of disturbance and, were they unobstructed, would form an ever increasing sphere, the waves decreasing in intensity as their distance from the center of disturbance increases. Wireless communication depends upon sending these waves through space and receiving them in an apparatus that will reproduce the sound by which they were originated.

The only difference between the wireless and the wire telephone consists in the apparatus that sends and receives. Since the waves travel from their source in all directions the transmission in the wireless must be much stronger than that in the ordinary telephone. Since the force of these waves decreases more rapidly in space than in the wires, the radio receiver must be a much more delicate instrument than the receiver of the ordinary telephone. The delay in making the wireless telephone useful was caused by failure to discover a device that would render the receiver practical. Finally, such a device was invented by Dr. Lee de Forest, an American expert electrician. It is known as the audion, or vacuum tube. In appearance it resembles a small incandescent electric lamp. By means of the vacuum tube, the strength of the wave is rapidly multiplied. This tube also changes the alternating current of the transmitter into a direct current which flows only in one direction and in this way adapts it more perfectly to the receiver.

The development of wireless telephony dates back almost as far as the original conception of the use of electromagnetic waves for wireless telegraphy, but the practical utilization of this method of com-

munication is of comparatively recent date. This has been due to certain differences in the fundamental requirements of telephony as compared with those of the telegraph.

Broadly speaking, the principal difference between wireless telephony, which we will call radio, and wireless telegraphy, lies in the form of the signal which has to be transmitted, telegraph signals being obviously far simpler in the wave-form of the signal current than are telephone signals. The fundamental requirement in either case is that the form of the receiving signal shall faithfully reproduce the form of the transmitted signal, whether due to the opening and closing of a telegraph key or the vibrations of a telephone transmitter diaphragm.

The essential units required in a complete radio system may be grouped into the transmitting and the receiving elements. The receiving elements are similar to those required in wireless telegraphy. The transmitting elements differ, however, in many respects, and comprise the following essential elements:

1. A radio frequency generator.
2. A modulator for controlling the radio frequency current.
3. An antenna for radiating the electromagnetic waves produced by the radio frequency current.

The radiophone, or wireless telephone, is subject to certain particular limitations in the same way as wireless telegraphy, notably that of interference due to atmospheric electricity or radio signals foreign to the desired signal.

The first requirement for any radiophone station is a source of radio frequency current whose amplitude from cycle to cycle remains constant, except when varied by the modulation imposed upon it by the voice current. If variations in its amplitude occur, due to other causes, these variations will introduce disturbances which will cause the system to be deficient in the effective transmission of speech. For this reason, the original source of radio frequency current used in wireless telegraphy, namely, the oscillatory discharge of a condenser supplied with energy from a low frequency source, is entirely unsuited to the purposes of the radiophone.

The first successful attempts at radio telephony were begun with the development of the Poulsen arc. These attempts involved the second factor in a radiophone station, namely, that of modulating the radio frequency current in accordance with the currents supplied by a telephone transmitter. The early attempts to accomplish this modulation, by means of microphones inserted directly in the antenna circuit, or coupled to the circuit in various ways, were largely unsuccessful, due to the limitations of the microphone devices, such as the low current capacity and the small range of variation of resistance.

A second source of radio frequency current is the high frequency alternator, which has been developed in various forms for radiophone transmission. The same lack of a suitable modulating device handicapped the use of the high frequency alternator until the advent of the audion or vacuum tube.

Vacuum Tube. The vacuum tube possesses in a remarkable manner the precise characteristics required for the generation and modulation of radio frequency current for low-power radiophone stations, and for the detection and amplification of radio signals of any character whatsoever. Its influence on the art of radio telephony may well be compared with the influence of the internal-combustion engine on aviation.

The requirements of a radio frequency generator may be grouped as follows:

1. The desired frequency may range roughly between the values of 15,000 and 6,000,000 cycles per second.
2. The frequency for any particular generator may be required to vary over a considerable range, in some cases as much as several octaves. In other cases, a single value of frequency is sufficient.
3. The frequency when set at a particular value should remain substantially unaffected by ordinary changes in the physical or electrical conditions associated with the station.
4. The current delivered by the generator should approximate a sine wave as closely as possible.
5. The required output for different classes of stations may vary from less than one watt to several hundred kilowatts.

6. The efficiency of the generator should be reasonably high, though not necessarily comparable with the efficiencies obtained from ordinary types of generators.

When used as an oscillator, or radio frequency generator, associated with properly designed circuits, the vacuum tube will meet all of these requirements.

Again, the requirements of a modulator for radio telephony may be grouped as follows:

1. The modulator should be actuated by the current from an ordinary microphone telephone transmitter or its equivalent.

2. The modulator should faithfully reproduce, in its effect upon the radio frequency current, the wave-form of the tele- the Baldwin works had a capacity of ten LOCOMOTIVE; BALDWIN, MATTHIAS.

3. The modulator should be capable of almost completely modulating the output of radio frequency generators, whose power outputs may cover the range indicated above.

These requirements are fulfilled to a remarkable extent by the vacuum tube used in properly designed circuits.

Although the vacuum tube was invented in 1906, its development into a sufficiently practical form to be useful for the radiophone was comparatively slow. This development was greatly accelerated, beginning in 1912, when the American Telephone & Telegraph Company became interested in the vacuum tube for use in telephone repeaters. Rapid improvements were then made in the design and construction of vacuum tubes, and at the same time experiments were conducted, looking to the use of the vacuum tube in radiophone apparatus. As a result of these experiments, the transmission of speech from Washington, D. C., to Paris and to Honolulu by radio occurred during the year 1915. In these experiments the vacuum tube was used as a radio frequency generator, a modulator, a detector and an amplifier.

The possibilities of the vacuum tube having been partly disclosed by these experiments, the United States Navy Department became actively interested in the development of radiophone apparatus for use on warships. Experimental sets were developed by the Western Electric Company, and extremely interesting results were secured. The Signal Corps, U. S. A., was likewise interested in the development of apparatus for the army, but experiments had not proceeded to the point where any satisfactory apparatus had been developed prior to the declaration of war by the United States in 1917.

THE AIRPLANE RADIO SET. Before the outbreak of the European war the use of wireless telegraphy in military operations had been limited to an extremely narrow field, while radio telephony had been used hardly at all. The communication requirements for the armies engaged in the trench-warfare style of conflict emphasized the need of radio communication, and the use of wireless telegraphy rapidly increased. But there was as yet no satisfactory apparatus for the use of radio telephony by the military forces. The particular field which most urgently required its use was the airplane communication system. Telephony was more desirable than telegraphy for airplane installation because it eliminated the necessity of a knowledge of the telegraph code on the part of the aviator. An additional advantage lay in the speed with which telephone transmission can be effected.

American engineers and manufacturers rapidly solved the problem, and the development, production and operation of the airplane radiophone set forms an important part of the general history of wireless telephony. Almost immediately following the declaration of war by this country, the chief signal officer of the army issued orders for the development of a radiophone set to furnish telephone communication between the different airplanes of a squadron, and also between an airplane and a ground station. The fundamental requirements for this set were based partly on information furnished by the allies, and partly on the experience of the U. S. Signal Corps in the pre-war experiments in airplane radio telegraphy and telephony. The actual development work was intrusted to the engineering department of the Western Electric Company, airplane facilities being supplied by the Signal Corps as required.

In six weeks radio communication had been established between an airplane and a ground station; inside of six months production of airplane radiophone sets in quantity was begun, after tests had been made under actual conditions on the battle fronts in Europe. In the summer of 1918 the development of an improved type of airplane set was begun, and at the time of the armistice in November of that year practical trials of the completed sets were in progress.

The production of several thousand airplane radiophone sets in a few months involved many problems of an extremely unusual and difficult nature. As an example may be cited the production of the vacuum tubes required for use in the sets. Prior to the war, vacuum tubes had never been produced at the rate of more than a few hundred tubes per week. At the time of the armistice the production of these tubes in one factory alone was in excess of 25,000 per week, the largest part of which was intended for use in airplane radio sets.

Briefly stated, the requirements for an airplane radiophone are as follows:

1. The apparatus should be capable of effecting reliable telephone communication between two airplanes at distances up to 2,000 yards.

2. The weight of the apparatus should be the minimum possible consistent with meeting the range requirements and other conditions imposed on the operation.

3. The apparatus should be of the simplest possible construction, and should require the minimum amount of adjustment or manipulation by the aviator.

Among special conditions encountered in airplane radio practice may be mentioned the tremendous noise and vibration created by the engine and wind, the necessity of reducing fire hazard to a minimum, and above all that the apparatus shall not interfere with the various other functions of the aviator. These conditions have been met by the latest airplane radio sets.

The complete radio set for airplane use contains elements that may be grouped as follows: 1, power plant; 2, transmitting plant; 3, receiving unit; 4, antenna system. Power is furnished from dry batteries for the receiving tubes, and for the telephone transmitters by a double voltage direct current generator, which is driven by an air fan, the complete generator being mounted on one of the struts of the landing gear of the airplane and being directly in the propeller blast. A single vacuum tube of a special type is used for furnishing the radio frequency current, and a similar tube is used for modulating the current. The method of modulation employed is known as the "constant current" method. The telephone transmitter is also of special type, the ratio of noise signals to speech signals in the output of this transmitter being probably less than 1 per cent of the same ratio for a transmitter of the usual type. As the apparatus is adjusted for a particular wave-length before the airplane leaves the ground, an artificial antenna whose constants approximate those of the normal antenna is used for making such adjustments on the ground.

The receiving set comprises a single resonant circuit, a vacuum tube detector, two vacuum tubes used as amplifiers, and a special sound-insulating helmet containing the receivers. The adjustment of the receiving set is of the utmost simplicity, there being only a variable capacity and inductance to adjust for the particular wave-length of the received signal. As in the case of the transmitting set, these adjustments are ordinarily made before the plane leaves the ground, and it is usually necessary for the aviator to make in flight only an extremely small adjustment to insure the proper tuning of the receiving set.

The form of antenna adopted for the early experiments with the airplane radio consisted of a wire trailing behind the plane in flight and connected through the apparatus with the frame of the plane as a counterpoise. The length of this wire was ordinarily 300 feet. A reel was provided for holding this wire, which had a small weight at its free end to assist in unreeling it on leaving the ground. Various improved types of antenna, which do not interfere with the movement of the airplane, have since been developed.

APPLICATIONS. In the last few years

the use of radio has been tremendously increased, and radio apparatus is now found in the American home as a popular means of entertainment. Radio sets may be obtained for local use at the cost of a few dollars, while others of more expensive types enable the owner to "listen in" to points from Cuba to Hawaii. It is possible that improvements in direct radiation may be evolved which will cause the greater part of the waves radiated from a radio station to choose a particular path, rather than to be spread broadcast as at present, but there will always be a more definite and restricted path for wire telephone signals than for wireless. As a result, it may be safely predicted that radio, no matter how commercially useful it may become, is not apt to supersede wire telephony in any of the fields now occupied by the latter. The application of radio to new fields, where wire telephony is impractical or impossible from economic considerations, will furnish abundant opportunity for service of the greatest value. A combination of wire and wireless telephony, each in its own field, may result ultimately in a telephone system covering the civilized world.

Radio telephony between ships at sea or between a ship and a shore station is a logical supplement to the wireless telegraph service now furnished on practically all ocean-going steamships, and the steamships on the Great Lakes. Many of these are now radio-equipped, the most notable example being the great steamship *Leviathan,* formerly German-owned, now operated by the United States Shipping Board between the United States and Europe. This mammoth vessel, replaced in service in the summer of 1923, has the most powerful wireless equipment on the high seas, including a 6-kilowatt tube code transmitter, assuring telegraph communication with points 3,000 miles distant, or with Europe and America on voyages; and a 2-kilowatt radiophone installation which provides voice contact with other vessels and stations on both sides of the Atlantic. The *Leviathan* also has a special emergency 600-meter spark transmitter, in addition to the regular installations; also several sensitive vacuum tube receivers, radio frequency amplifiers, and interference eliminating devices. Two large motor lifeboats, designed for towing other lifeboats in strings, are also completely radio-equipped. Each boat is equipped with a ¼-kilowatt transmitting outfit and is capable of sending and receiving radio messages a distance of at least 250 miles.

Broadcasting. Each transmitting station usually sends waves of a definite length, and the receivers within the field of that station should be tuned to these waves. There are above 149 wave lengths that are of practical value in radio communication. These wave lengths vary from 200 meters to 360 meters for the broadcasting stations in most general use. Minor government stations use a 485-meter wave length. The stations for helping ships to find their position use an 800-meter wave length, but those stations designed to communicate with others at great distances use wave lengths from 5,000 to 30,000 meters. The receiving stations are not limited to any particular wave, but by manipulating their switches, they may "tune in" to receive anything that is passing through the ether. Sounds that are audible in one wave length are not audible in another.

Uses. Perfection of broadcasting made radio suddenly popular. In 1922 and 1923 demands for radio sets in the United States were so great that manufacturers were unable to keep up with their orders. Thousands of homemade sets were also put into use. The use of most of these sets is for entertainment in the homes in which they are established, but there are many business uses for which radio is now valuable. The radio stations of the United States government received a revenue of nearly $500,000 in 1921, for business messages. Radio is now used for broadcasting prices; by the Weather Bureau, for broadcasting the weather reports; on submarines, and practically all first class ships for communication with the mainland and for the use of the passengers. There is scarcely a line of communication to which this system may not in time be applied.

Radiometer, any instrument designed for the detection of radiant heat. The best known form is one devised by Sir William

Crookes, consisting of four light vanes of mica or aluminum foil which revolve upon a needle point within a glass globe from which the air is almost exhausted. One face of each vane is blackened, while the other is bright, and when placed in sunlight or near any light, rotation with the bright sides of the vanes in advance is set up. This is due to the greater heating of the blackened surfaces, which causes the molecules to move more rapidly and strike more blows on the darkened faces.

Radish, a familiar garden vegetable. It belongs to the mustard family. It is thought to be a native of temperate Asia, but there is no known region in which the radish now grows wild. As radishes may be grown closely together and may be had for the table four weeks from the time the seed is sown, it is said that a small plot of ground sown to radishes will produce more food than if planted to any other vegetable known. The list of varieties is a long one. The chief types are the early scarlet, having a globular root, and the long scarlet, having a root of parsnip shape. See VEGETABLES.

Radium, rā′dĭ-ŭm, a metallic element not unlike table salt in appearance. It was discovered in 1898 at the University of Paris by Professor Curie and wife. Pure radium is seldom prepared, as it is too expensive. This new element is remarkable for the peculiar penetrative power of rays which it gives off. These seem to be of three sorts. They are named after the first three letters of the Greek alphabet, Alpha, Beta, and Gamma. The most powerful are strong enough to affect a photographic plate after passing through a foot of iron. These rays give off but little light, yet pass through all substances, solids, liquids, and gases, having a much greater penetrative power than the so-named x-rays. Radium gives off enough heat to melt its own weight of ice every hour. It discharges electrified bodies and destroys the life of seeds. Held near a person's body its rays penetrate the clothing and burn into the flesh. Tubes containing it cannot safely be handled with bare hands. When dissolved in water it produces a peculiar gas or emanation which is used in treating some diseases. The intense activity of radium does not seem to affect its weight or power, and it is estimated that a tube of it will retain its strength for centuries.

Radium is valuable for removing ulcers, warts, corns and scars, and in the treatment of superficial cancers, but it should be applied by some physician experienced in its use. By mixing a small quantity of radium with a specially prepared phosphorescent zinc sulphide, a fairly permanent luminous material is produced. When this substance is applied to dials it makes them readable in the dark, and it was extensively used on watch dials in the World War.

If one wished to incur the expense, it is thought that it would be possible to illuminate a room by painting the walls and ceiling with radium so that one could read in it at night without difficulty, and it is estimated that this illumination would last for ten years.

Radium was discovered in pitchblende, an ore of uranium (which see) and for several years this was supposed to be the only source from which it could be obtained. The ore was mined in Bohemia and the manufacture was carried on exclusively in France and Germany. Meantime, experiments with other ores of uranium revealed the presence of radium. The most important of these was carnotite, and there are extensive desopits of this ore in Colorado and Utah.

The extraction of radium from its ores is a long and complicated process, and requires the investment of a large amount of capital. In 1912, the United States Bureau of Mines established a laboratory at Denver. Later, in co-operation of the National Radium Institute, this laboratory was expanded into a plant for the production of radium on a commercial scale. It is estimated that up to January 1, 1921, this plant had produced about two ounces of radium. A new process was discovered which has reduced the cost of production from over $100,000 to $40,000 per grain.

The property of radioactivity is possessed by radium to a remarkable degree. This is the property peculiar to certain substances of spontaneously emitting rays of a nature distinct from the ether-waves of ordinary

radiation. The radiation from such substances does not affect the retina of the human eye directly, but it has the power of discharging electrified bodies, of affecting photographic plates, of exciting fluorescence and phosphorescence, and of producing certain chemical and physiological results.

Radioactivity appears to be a property common to the elements radium, uranium, thorium, polonium, actinium, and their compounds. It was first detected in 1896 by Becquerel, the French scientist, who discovered that when compounds of uranium were placed in the neighborhood of a photographic plate, completely protected from the direct action of light, the plate was acted upon, and that the photographic action occurred even though a thin layer of metal was placed between the radioactive substances and the sensitive film. While seeking for similar properties in other substances, the Curies discovered that the elements uranium and its compounds were radioactive, and further that certain minerals containing uranium possessed this property in a higher degree than uranium itself. The extraordinary activity of pitchblende led to the study of this mineral with a view to the separation of the substance to which this property was due, and to the discovery of the new element, radium, the compounds of which are a million times as radioactive as uranium.

A scientific method for the detection of radioactivity depends upon the power of the rays to render air a conductor of electricity and thus to discharge electrified bodies. By means of the rate of discharge, as measured by a sensitive electrometer, the radioactivity of different substances can be compared, and even a slight degree of radioactivity can be detected. By this means radium has been shown to be a widely distributed element, present in rocks, soils, and waters in various parts of the world, though only in the minutest quantities. The study of the mysterious properties of radium and its compounds continues to engage the attention of many eminent scientists, and its value to medicine and the arts probably still lies largely in the lap of the future. See CURIE.

Radius. See CIRCLE.

Raffia, răf′fĭ-a, a Madagascar palm. The tough, stringy raffia of commerce is a fiber stripped from the under side of the leaves. It is twisted into skeins and baled for export. It turns brown in drying. Raffia is used by the natives in weaving matting and cloth. Hats are made of it in England. On account of its softness, strength, and durability, gardeners prefer raffia for tying tender plants to stakes or trellises. It is much used in the vineyards of Europe. It is an excellent wrapping for grafting. Raffia weaving has become a favorite kindergarten occupation in American schools. See RAMIE; HEMP; SISAL; MANILA.

Raffle. See LOTTERY.

Raft. See CATAMARAN.

Ragnarök, rag′nä-rek, in Old Norse mythology, the twilight of the gods, or doomsday of the gods. Ragnarök was the time when gods and men were to be destroyed,—when in a great battle with the powers of evil, the universe would be utterly consumed by fire. Certain warning signs of the evil day will appear. Then winters broken by no summer will come. War and discord will spread throughout Jotunheim, Alfheim, and Midgard. The earth itself will tremble. Feuris, the wolf, will break his bonds, the Midgard serpent will rise from the sea. Feuris will slay Odin and be himself slain by Odin's son. Thor will kill the serpent, but die from the combat. Loki and Heimdall will fight till both fall dead. While roaring flames fill all space, the "sun will grow dim, the earth sink into the ocean, the stars fall from the sky, and time will be no more." This is Ragnarök.

Rags, worn-out cloth. The rags collected in the cities are assorted and baled. Cotton rags are sold to paper mills for use in making commercial stationery, known in the trade as rag paper. Linen rags go to the same destination to be used in making stationer's linen or correspondence papers. The woolen rags go to the shoddy mill to be unraveled, picked into the original wool, recarded, spun and woven, either alone or mixed with new wool, into cheap cloth. See SHODDY.

Ragweed, a common annual weed. There are two common species, the giant ragweed, or horse cane, and the little ragweed, called also hogweed, bitterweed and Roman wormwood. The giant or great ragweed is found often in cities, and on river banks, and grows sometimes twelve feet high. It has a rough, stout stem, with large, deeply three-lobed leaves. The little ragweed is a nuisance everywhere east of the Rockies. It flowers from July to September, and is in seed from August to December. The plant is greatly branched and hairy, with thin, ragged looking, finely cut leaves. The greenish-yellow flowers are very small, and borne in heads, which in turn form racemes. The seeds are found in grain, clover seed, and hay, for the plant grows in all crops. Mowing the plants two or three times during the period of flowering will get rid of them in open spaces, and burning or mowing stubble will accomplish the same result in the wheat fields. Hoed crops should be cultivated late, and the ground seeded afterward to clover, winter wheat, cow peas, or other dense crop which will choke the weeds. Annual weeds seldom thrive in sod or a dense crop.

Raikes, rāks, **Robert** (1735-1811), the founder of Sunday schools. His father, of the same name, was proprietor of the *Gloucester Journal.* Robert inherited the paper and continued the enterprise for forty years. In 1780 he became interested with friends in the question of Biblical instruction for children, the outcome being the establishment of the first Sunday school. Some account of the school given in the *Journal* attracted attention in London and brought him into prominence. He lived to see many hundreds of Sunday schools established.

Rail, a family of birds allied to the cranes and coots. The order stands next to that of shore birds or snipes. The common Virginia rail would pass for a fair sized snipe. It is distributed from the Atlantic to British Columbia, nesting wherever marshes of reeds, cat-tails, or tall grass are to be found. It is a timid bird. Save in time of migration, it does not leave cover willingly. It will creep through the grass, hide under water, and resort to all manner of devices before it rises. When it is flushed it flies with a feeble, aimless flutter, its legs dangle in a helpless fashion, and the bird tumbles into cover a few rods away, as though a charge of shot had passed through it. Were it not for its feeble call, one might pass by its swamp for a lifetime and not suspect its presence. It is an olive-brown bird, streaked and barred with black. If seen unnoticed, it steps about with great deliberation, thrusting its long bill into the soft mud and ooze. Its long bill and short, up-turned tail give it a queer, unbalanced look; but it can dart into cover or skip across a pool on the leaves of water plants with a quickness that is surprising. Other American rails, for there are a dozen species, are the king rail, the largest of all; the clapper rails of salt marshes; the Carolina rail, a favorite with gunners; the sora, a yellow rail recognizable by its slow cry of *krek, krek;* and the little black rail, seldom seen, about five inches in length. In Great Britain the corresponding birds are called land rails and water rails. The land rails are called corn-crakes. They nest in meadows and not infrequently lose their heads by the mower's scythe. The narrow build of the bird, enabling it to step between the stems of sedges, has given rise to the popular saying "As slim as a rail."

Rail, one of the steel bars or beams that, laid end to end, constitute the permanent way of a railroad, serving to support and guide the wheels of locomotives and cars. The length of such rails on steam roads is usually 33 feet. The general form now most in use for such roads is that known as the T-rail, or a rail of T-section. Rails are classified according to the weight in pounds per yard. On branch lines and roads having comparatively small traffic, with light locomotives and cars, 65 and 70 pound rail is in use, but on the great majority of American railroads 85 or 90 pound rail is now laid, and lighter rail is usually replaced with the heavier standard rail as it wears out. On roads of dense and heavy traffic, such as the main lines of the New York Central, the Pennsylvania, the Virginian Railway, the Norfolk & Western, and some

roads in the West, a 100-pound rail has been standard in recent years, and a steel of special alloy is used for the rail on curves. The Pennsylvania in 1914 began to lay 125-pound rail on some of its divisions.

The three parts of a rail are the head, the web or middle part, and the base. Rails are laid, in American practice, to a gauge of 4 feet 8.5 inches or that distance apart, in parallel lines, to constitute a railroad. In England the rail is held in a chair, which rests on the ties or sleepers. In the United States and Canada the base of the rail rests either directly on the tie or on a tieplate, and the rail is held in line by spikes driven into the tie, which keep it from moving laterally. The head of each spike projects over the base of the rail.

Rails were at first made of iron, but now generally of steel. The first steel rails were made in England by Mushet in 1857. The development of the use of steel rails, stimulated by the invention of the Bessemer process for making cheap mild steel from which rails of far greater durability than those of wrought-iron can be manufactured, was rapid, until steel rails were substituted for wrought-iron rails on nearly all important railways in the world. The United States now leads the world in the production of steel rails. The steel production in 1921 was 19,743,000 long tons, of which 2,178,818 tons went into rails.

Rails are produced in steel mills by the process known as rolling. Rolling is the operation of reducing the section of pieces of metal, or shaping them, by passing them between revolving cylinders, called rolls. A rolling mill consists essentially of the rolls set in a suitable framework to support them, and connected with the engine or motor, electric power being used as a recent development. Rolling is generally performed hot, or at least as a preliminary operation. In some cases the metal is cold rolled, to secure greater accuracy, smoothness, or freedom from scale, or on account of the greater strength secured by cold rolling. In rolling, the rolls are kept rigidly in one position while revolving and the desired shapes and sizes are secured by passing the metal through a succession of rolls, each of which does its part in the reduction.

The heated metal direct from the furances is presented direct to the rollers, and is drawn through between the trains, as they are called, each train being a set of steel rolls placed either in pairs one over the other, as in a two-high train, or in a group of three, as in a three-high train. When the metal passes through one set of rolls, it is at once caught on the other side and repassed between the rolls, each passage between them being called a "pass." In a two-high train the rollers are stopped and reversed at each pass. In a three-high train the rollers turn constantly in one direction, the return pass being between a different pair of rollers from the first passed through, the middle roller, however, being always one of either pair. The distance between the rollers is regulated by screws at the ends. The section given to the metal passing through the rollers is determined by the shape of the rollers, whether flat or grooved, it being possible to produce in this way bars having a great variety of sections, adapted for independent or structural uses. The rolling mill serves also to some extent to clear the metal from impurities.

In the manufacture of steel rails, a mass of metal from the furnace, rolled down from an ingot to an 8 by 8 inch "bloom" in the blooming-mill of the steel-works, is first cut by shears into pieces depending upon the size of the rail to be rolled. After being reheated, and hot enough to roll into rails, the bloom travels along a roller line to the first, or roughing, set of rolls. Here it is given five passes, and then five additional passes in a second set of rolls, finally one pass in the third, or finishing rolls. It is now a rail, and travels on another roller line to the hot saw, where it is cut into lengths of about 33 feet 6.5 inches, the allowance of 6.5 inches above standard length being made for shrinkage in cooling. While cooling on the hotbeds, the new-made rails seem to be animated, as they move first one way, then the other, and shrink rapidly. When cooled, the rails are placed by an endless chain conveyor on another bed, from which they are picked up by an electric crane and removed to the straightening presses, and all burrs caused by the hot-sawing process are removed

before they are straightened. They are then transferred to drill presses, where holes for the splice bars are drilled into them, and they are then placed on the loading platforms for examination by inspectors, including those of the railroad company for whom they are intended. When ready for shipment they are picked up by electric magnets operating in connection with a crane, and loaded into cars for their destination in the roadbed of a railroad, which may be in either Europe, Asia, Africa, North or South America, or even Australia, for American-made steel rails are shipped to every quarter of the globe.

Railroad, or **Railway,** a road or way upon which one or more lines of rails are laid to guide and facilitate the movement of vehicles for the transportation of passengers or freight, or both. The terms railroad and railway are synonymous in this sense, and are used interchangeably; but the former is generally preferred in the United States, while the latter is universally used in England.

Railroads are usually constructed on the surface of the ground, but in cities we also find elevated railways, like those of New York and Chicago, and underground railways, of which the subway system of New York and the older system of London are the best known examples.

The essential parts of an ordinary surface railroad are the roadbed, ballast, ties or sleepers, rails, rail-chairs, splices, spikes, switches, switch mechanism and signals; the whole forming what is commonly known as the permanent way. But in popular usage the terms railroad and railway are extended to include besides the permanent way, everything necessary to the operation of the road, as the rolling-stock, buildings, etc. The rolling stock includes steam or electric locomotives, passenger and freight cars, and other wheeled equipment for special uses. The necessary buildings of a railroad include stations, freighthouses, roundhouses or locomotive terminals, locomotive shops, car shops, and repair shops, coaling stations, water stations; and in the case of electric railways or those partly operated by electricity, powerhouses are also required at intervals along the line.

ORIGIN. The railroads, which now cover the United States in a vast network and in all civilized countries have been the object of gigantic undertakings, may be traced to a contrivance for simplifying the transit of coal from the mines in northern England to the places of shipment on the rivers Tyne and Wear. The invention consisted of a double parallel line of wooden beams or trams, fixed to the ground and furnished with flanges to prevent the wheels of vehicles from slipping aside. Along these flanged beams wagons were drawn by horses with such comparative ease that, instead of a load of 17 hundredweight by a common road, a load of 42 hundredweight could be drawn by a single horse. These new thoroughfares, called tramways, were made across fields, the owners of which received a certain rent for the use made of them, or the "way-leave," as it is still called in England, while in America it is called the "right of way."

The date of the invention of tramways is uncertain, but it believed to have been between 1602 and 1649. Their use extended to other mining districts, and about 1700 long strips of iron were added to the wooden beams, or trams, to prolong their life. Then came, in 1740, the first use of cast-iron rails, fixed in parallel lines on cross wooden sleepers, and this was the real pioneer of the modern railroad. The use of cast-iron rails led to an improved method of traction. Instead of employing a single large wagon, the plan of linking together a series of smaller wagons was adopted—the germ of the modern train.

The next improvement consisted of putting flanges on the wheels of the vehicles instead of on the rails, by which transit was greatly facilitated. Horses still furnished the motive power; but as the railway system seemed to possess immense capabilities of expansion, many minds labored in devising schemes to substitute steam power. James Watt had already shown the practicability of fixed or stationary steam-engines; what was now wanted was an engine that would travel and exert tractive effort by its own internal impulse. Then came the invention of the locomotive, and the era of steam railways began.

Application of Steam. The first locomotive designed to run upon rails was built in 1803 under the direction of Richard Trevithick, a Cornish mine captain, in a blacksmith shop connected with the iron works of Merthyr Tydvil, Wales. Trevithick had been experimenting for several years with a steam carriage for common roads, or highways, and his efforts became widely known. Then a Welsh ironmaster made a wager of 1,000 guineas that he could convey a load of iron for a distance of nine miles on a cast-iron tramway by the power of steam alone. Trevithick was selected to build an engine to win the wager. In February, 1803, his engine turned the trick. It was "fearfully and wonderfully made, with its complication of gearing and its great length of stroke," yet it was a practical machine and "contained all the elements of the modern locomotive except the multitubular boiler." This engine had a return flue boiler which was fairly effective. It was carried by two pairs of wheels, 52 inches in diameter; the boiler was 60 inches long, and there was one cylinder, 8 by 54 inches, to transmit the power. After being used, the steam was passed into the smokestack, where it aided in creating draft upon the fire.

In 1825 the Stockton & Darlington Railway, in England, a public enterprise, 25 miles long, was opened. The first locomotive used on this road was built by George Stephenson & Son, who had established works at Newcastle, and was called *Locomotion.* Stephenson's *Rocket,* the first high-speed locomotive, which attained a speed of 28 miles an hour, with one carload of 36 passengers, at the famous Rainhill tests of the Liverpool & Manchester Railway in 1829, was a four-wheel engine, the front pair being the drivers, to which power was transmitted from outside cylinders set diagonally across the boilers, pointing toward the back head. The first improvement made was to drop the cylinders to a nearly horizontal position at the sides of the firebox.

Then came the *Planet* type of engines, which showed the beginning of the established form. The first *Planet* built by the Stephensons had the driving wheels placed behind and the cylinders located in the smokebox, from which the power was transmitted to the driving wheels through a cranked axle. Many engines of this type were imported into the United States and influenced early American design, especially in New England.

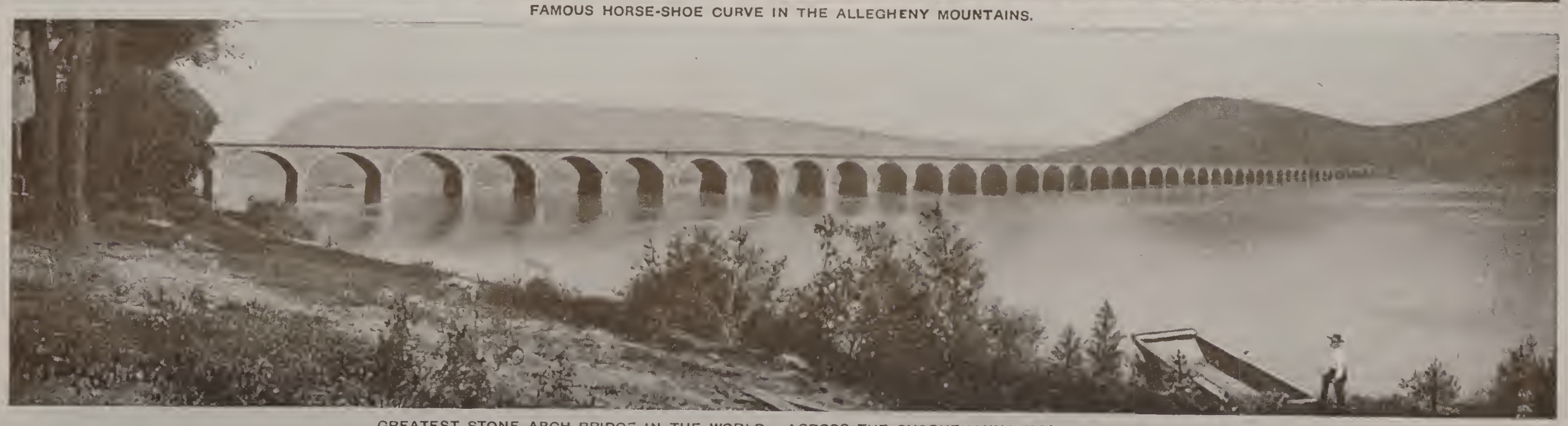
The first locomotive that ran on rails on the American continent was the *Stourbridge Lion,* which was brought from England by the Delaware & Hudson Canal Company, and was tried near Honesdale in 1829. The engine was selected by Horatio Allen, a pioneer engineer, who ran it in its American trials. It weighed seven tons and was reported by Mr. Allen to be too heavy for the tracks and trestles; consequently the engine was laid away and gradually dismantled. It was of the vertical cylinder type, which was favored by the early locomotive builders for hauling coal. In 1905 the boiler and other parts of this historic engine were collected and sent to the Smithsonian Institute, Washington, D. C., where it was reassembled with the aid of a few new parts and may now be seen in its original form, as tried out by Horatio Allen in August, 1829.

As the first locomotives seen in this country were imported from England, they furnished at first the types and patterns from which the earliest locomotives built in America were fashioned. But American designs very soon began to depart from their British prototypes, and a process of adaptation to the existing conditions of the railroads in this country followed. This process afterward differentiated the American locomotives more and more from those built in Great Britain. One of the first of the marked features of difference between American and English locomotives was the use of a "truck" under the former.

In almost all of the earlier locomotives the axles were held by the frames so that the former were always parallel to each other. In going around curves, therefore, there was somewhat the same difficulty that there would be in turning a corner with an ordinary wagon if both its axles were held parallel and the front one could not turn on the kingbolt. In 1831 Horatio Allen built the first locomotive with swivel-

HELL GATE—Colorado

FAMOUS HORSE-SHOE CURVE IN THE ALLEGHENY MOUNTAINS.



GREATEST STONE ARCH BRIDGE IN THE WORLD. ACROSS THE SUSQUEHANNA NEAR HARRISBURG.

PENNSYLVANIA SCENES

ing trucks. The engine had eight wheels, arranged in two trucks. One pair of driving wheels and a pair of leading wheels were attached to frames which were connected to the boiler by kingbolts, about which the trucks could turn and thus accommodate the wheels to the curvature of the track. This principle was afterward applied to railroad cars, and nearly all the rolling stock in America is now constructed on this plan, which was first proposed by Mr. Allen in a report dated May 16, 1831, to the South Carolina Canal & Railroad Co.

In the early days of the Baltimore & Ohio Railroad, which was chartered in 1827 and partly opened in 1830, Peter Cooper, then a merchant in Baltimore and an amateur mechanic, designed and supervised the building of a small locomotive which was called the *Tom Thumb.* This was built to prove that the Baltimore & Ohio road could be operated by steam, and its success, even in model form, gave historic importance to this little engine. After successful experiments with it, the management of the Baltimore & Ohio offered a prize of $4,000 for a locomotive built in the United States which would haul 15 tons gross weight at 15 miles an hour. In due time the offer brought to the company five new locomotives, built at different places, all differing in design, and none of them imitating British models. American locomotive building then began its independent and highly successful career.

M. W. Baldwin, founder of the Baldwin Locomotive Works, Philadelphia, built his first locomotive, *Old Ironsides,* in 1832 for the Philadelphia, Germantown & Norristown Railroad, at a cost of $3,000. In 1873 the Baldwin works had a capacity of ten locomotives a week and employed about 3,000 men. In 1918 the works built and shipped 3,580 complete locomotives, and at present, based on an annual capacity of 3,500 locomotives, the works give employment to 21,500 men, occupy 137 large buildings, and consume weekly about 6,500 tons of iron and steel, 3,000 tons of other material, 4,200 tons of coal, and about 175,000 gallons of fuel oil. Baldwin locomotives and those of the American Locomotive Co. and other American builders are now shipped all over the world. See LOCOMOTIVE; BALDWIN; MATTHIAS.

Little advance was made in the construction of freight cars for a considerable period after railroading began in America, the early railroads of this country having been designed to carry passengers rather than freight. As late as 1848 the American freight car is described as a square box, of 6 to 10 tons' capacity, with a roof covered with cotton duck, painted and sanded. The hot sun cracked this covering and let water in on the freight, an annoyance common also to passenger coaches of that day. Few freight cars were used and as wood was the universal fuel, there was no coal transportation. With the adoption of the bogie, or swiveling, truck for freight cars, their size began to increase, and by 1856 the freight cars were from 28 to 30 feet long. In those days the freight cars were built much more strongly than the passenger coaches; and a Baltimore & Ohio freight car 28 feet long, capacity 9 tons, itself weighed 6 tons.

Metallic freight cars, both box cars and gondolas, were being built in 1878, certain cars of this period having soft steel rods for their framing. They were built more cheaply than all-wood cars and were the pioneers of all-steel construction, having the additional advantages of lightness and increase of carrying capacity. From this point the construction of freight cars slowly evolved, until in 1921 a large number of steel gondola cars of 120 tons' capacity were put in service on the Virginian Railway for carrying coal.

The earliest types of passenger coaches on American railways were of the stage coach body type, but developments soon came and the American type of passenger car became distinctive, with its end entrances, instead of side entrances as in the European types, and its continuous passage between cars for the greater comfort and convenience of passengers. The first Pullman car, called the *Pioneer,* was placed on the road in 1863. George M. Pullman had begun to plan an improved sleeping car in 1858, after traveling in one of the crude affairs so called at that time. He transformed two Chicago & Alton coaches into better sleeping cars in 1859, but the

new day of travel comfort really dawned with the appearance of the *Pioneer*. It cost $18,000, an amazing price in those days, and was both higher and wider than most railroads could accommodate. It was not until President Lincoln's funeral that the roads between Chicago and Springfield, Ill., narrowed their platforms and adapted their bridges so as to allow the *Pioneer*, carrying the funeral party, to pass over their lines. General Grant soon after traveled in this car from Detroit to Galena, Ill., opening these lines to larger and improved passenger cars, and after that progress was rapid. The Pullman Company was organized in 1867.

Prior, however to the appearance of the first Pullman car, railroad history recounts that the first sleeping car ever used on an American railroad was placed in service during the winter of 1837-38 on the Cumberland Valley Railroad, now that part of the eastern region of the Pennsylvania Railroad system known as the Cumberland Valley division. The Cumberland Valley Railroad, running between Chambersburg and Harrisburg, had no sooner been opened in 1887 than its management was confronted with the question of providing some accommodation to take care of the extensive stage coach travel from the west, inasmuch as Chambersburg at that time had become the terminus for such travel. These coaches generally arrived at Chambersburg late in the night, and as their passengers were anxious to proceed on their journey, it became necessary, in order to meet this emergency, and in the interest of public comfort, for the railroad to provide a car in which passengers could sleep while traveling between Chambersburg and Harrisburg to connect with the early morning train for Philadelphia. The officials of the railroad, wishing to reduce the discomforts of the passengers as much as possible, decided to furnish sleeping accommodations. For this purpose, a passenger car named *Chambersburg,* with two-thirds of its room devoted to sleeping berths, was constructed by Imbry & Dash, of Philadelphia. This car was first operated on the Cumberland Valley division in the winter of 1837-38 and continued in service until 1848. It was the first sleeping car introduced on an American railroad. As this service was looked upon with considerable favor, authority was given in 1841 to convert a day coach into a sleeper to be called *Carlisle*. This was done under the direction of Jacob Shafer, one of the railroad's woodworkers. These cars were far from being as luxurious as the sleeping cars of the present day. However, they answered the purpose, and the travelers who used them spoke very highly of them.

Later Developments. Vast improvements have been made in the last forty years in the track-work and also in the buildings used by American railroads. An engine-house of the earlier days, for example, presented an appearance very different from its modern successor, the locomotive terminal, in which are installed many appliances and devices for the more convenient and economical handling of locomotives after a run, and the performance of the various operations required to condition them for further service. The importance of these improvements is evident when it is considered that the non-productive time of the serviceable freight locomotives of Class I railroads in 1921 averaged over seventeen hours out of twenty-four, at terminals, in engine-houses, etc.

Today the equipment of American railroads includes mammoth locomotives capable of handling trains of over a hundred loaded cars weighing in the aggregate 16,000 or 17,000 tons; freight cars of all-steel or steel and wood, with capacities ranging from 30 to 120 tons; passenger cars of steel construction, embodying every possible convenience and comfort for the passenger by day or night; Pullman coaches that are the last word in luxury of transportation; palatial stations and offices; signal systems and safety appliances that minimize the risks of travel, and literally hundreds of appliances to increase the efficiency of the transportation system that were unknown in the early days of railroading.

Growth. Previously to the opening of the Baltimore & Ohio Railroad in 1830 several tramways had been completed in the United States. The most important of these were one from Quincy, Mass., to the

coast and a line from a coal mine in Pennsylvania to Honesdale, 16 miles distant. At first all roads were worked by horsepower. The number of miles of railroad constructed in the decade ending in 1840 was 3,513; in that ending with 1850, new mileage totaled 5,508; in that ending with 1860, it was 21,614; and in that ending with 1870 it was 22,764. In 1910 the total railroad mileage of the United States was 240,438 miles. In 1920 the mileage in continental United States had increased to 263,707. Little new mileage was built for several years after the World War, during part of the period of which the control of railroads was assumed by the government and they were operated at a total loss of over a billion dollars by the United States Railway Administration. On March 1, 1920, the roads were returned to their private owners under the terms of the Transportation Act, and are now regulated by the Interstate Commerce Commission, which has power to fix the rates for passengers and freight, at such figures as to permit the roads to earn a maximum of 5¾ per cent upon their investment of capital.

SERVICE. The railroad service has made possible not only the growth of the population of the United States, but the extension of the farm areas. It has also been of great value to the country by providing means for the transportation of the rapidly growing manufacturing products. It will be readily appreciated that no such growth could have been possible without proper instrumentalities of transportation, such as have been furnished by the progressive steam railroads of the United States.

The influence of the railroads on agriculture and the growing wealth of the country has been no less marked. Prior to 1860 a vast agricultural territory in the West, then unsettled, was for sale at $1.25 an acre, and found no buyers. The hardships to be met, and the inability to transport surplus products from the farms at remunerative prices, offered no inducement for the settler; but with the advent of the railroads, or even the immediate prospect of railroad construction, lands which could not be sold at $1.25 an acre were rapidly purchased at $2.50 an acre, and the values rose from that time forward, as the railroads progressed, until farm property in the West brought prices that were relatively enormous.

The total amount of freight revenue of the steam railroads of the United States in 1900 was $1,049,256,323, which was 9.2 per cent of the value of the products of manufacture. In 1920 the total freight revenue of Class I roads was $4,317,608,483; adding to this 2.74 per cent as an estimate for all other roads, makes total freight charges of $4,435,911,000 in 1920, or 6.9 per cent of the wholesale or factory value of products of manufacture.

CANADA. The total mileage of the railways of Canada was approximately 39,058 in 1920. There are two great systems, namely, the government-owned railroads, known as the Canadian National Railways, and the privately-owned and operated Canadian Pacific Railway. The Canadian National Railways is a composite system of the original Canadian government railways and those lines in Canada, formerly privately-owned, which have been taken over by the government in order to maintain the public service.

ENGLAND. In England the mileage of 130 railways which were taken over by the government during the World War and not returned until August, 1921, was 21,546. The 46 roads not taken over by the government have about 499 miles of track. The mileage of all main tracks in Great Britain and Ireland is 36,499, and if the mileage of sidings is added, or 14,256, the total is brought up to 50,755 miles of track. During the past 50 years Great Britain's railway developments have been gradual and along conservative lines. They are now grouped in several large systems, under government control, but with private operation.

MANAGEMENT AND ORGANIZATION. The efficiency of railroad management under private control demands adequate service to the public at the lowest cost. Railroads are engaged in the manufacture and sale of transportation, their output being measured in units of tons and passengers carried one mile. The efficiency with which they function as a whole is measured by the quantity and quality of that output. Their efficiency

varies with different railroads, and involves a great many operating factors which differ with the methods, practices, and organization of each individual road.

In a general way the efficiency of American railroads in recent years, compared with prior years is indicated by the following figures: In 1920 a record movement of 447,278,126,869 ton-miles of freight traffic was handled, with 10,100,904 less freight-train miles than were necessary to handle 440,001,713,665 ton-miles in 1918, which was the first year of war-time Federal control and the previous record year in railroad operation in this country. The passenger-train service in 1920 showed an increase of 20,443,374 train-miles over 1919, but passenger service had not then been fully restored to the level existing prior to Federal control.

Another measure of the efficiency of railroad management can be obtained by a comparison of the actual performance of railroads with investment in their properties over a series of years. The statistics of the Interstate Commerce Commission show that for every $100 investment in property reported by the railroads, the performance in 1890 was 983 tons of freight carried one mile and 163 passengers carried one mile. As a result of improved equipment, better methods of operation, and better supervision since 1890, the railroads in 1920 carried for every $100 of property investment 2,063 tons of freight one mile and 231 passengers one mile, representing an increase of 110 per cent in freight and 50 per cent in passenger traffic. The years 1921 and 1922 were abnormal, owing to business depression and railroad and miners' strikes, which affected traffic.

The processes of railroad business represent a continued cycle of experiments, in efforts to better and cheapen facilities and operation, and further improvement in efficiency may be expected, especially through the introduction of more advanced methods in railroad shops and terminals and the installation of new and improved designs of machinery and buildings.

Management of railroad companies is conducted like that of other corporations, through a board of directors and corporate officers. There are also departments with important functions, under responsible heads, including the operating department, traffic, mechanical, legal and accounting departments. The larger roads are also organized by divisions of more or less mileage, and in a few cases, like that of the Pennsylvania Railroad, there is also an organization by regions, each region being in charge of a vice-president of the company. The management, especially of the large lines, is informed daily in regard to detailed items of cost and their relation to performance. These detailed items of cost show daily fuel consumption per unit of service, the actual performance of trains and locomotives, the coal consumed in such operation, labor cost, and all other items of cost and service which are necessary to gauge accurately the performance of the road and to supervise and control its operations upon the most effective and efficient basis.

In dealing between themselves and as a group with the public, the managers of the railroads in the United States have set up various organizations throughout the country, the most important of which are he various consolidated tariff bureaus and the American Railway Association. The duties of the tariff bureaus are the coordination and publication of passenger and freight tariffs, or rates. Since the return of the railroads to their private owners by the Federal government in 1920, these bureaus have established standing rate committees whose functions are to deal directly with the shippers of the country when discussing rate changes.

The American Railway Association had its origin in a "timetable convention" in 1872, and its name was finally adopted in 1891. Its original purpose was "to harmonize and coordinate the principles and practices of American steam railroads, with respect to their construction, operation, and maintenance." During and since the World War, however, the scope and work of the association has been greatly enlarged, until it is today the central organization of steam lines in dealing with the public, government departments, etc., and in coordinating the various activities of the rail-

roads. The association work is conducted by committees, under the following general divisions: Operating, transportation, engineering, traffic (as related to operation), mechanical, purchases and stores, and freight claims. There are also committees of the association in charge of the following special subjects: Car service, automatic train control, fuel conservation and inspection of standard material.

The Car Service Division is an agency of the American Railway Association, and is composed of a chairman and requisite number of managers, with headquarters at Washington, D. C. Its principal duties are: (1) To supervise the application of car-service and per-diem rules; (2) to regulate car supply as between railroads, and, when necessary to meet traffic conditions, to transfer cars from one railroad or territory to another; and (3) to obtain and compile such statements and car performance statistics as are deemed necessary. This division maintains contact with the Bureau of Service of the Interstate Commerce Commission, and assists in the adjustment of all complaints as to car service and supply on the railroads throughout the country.

Only sound credit enables the railroads to provide adequate service and facilities for the public. The soundness of railroad credit depends upon the roads earning a reasonable return upon the value of the property put to public use, to attract the new investment needed to increase transportation service and facilities. Such service and facilities must be enlarged and improved, so as to keep pace with the growth of the country and its business expansion. The Transportation Act of 1920 authorized the Interstate Commerce Commission to establish railroad rates so as to produce a fair return on the aggregate value, to be determined by the Commission, of the railway property of the carriers held for and used in the transportation service. This rate of return is to be fixed by the Interstate Commerce Commission from time to time, and a comprehensive valuation of railroad properties has been undertaken; this has occupied a large number of expert engineers and accountants for some years past and in 1923 was still far from being concluded, although a tentative valuation of $18,900,000,000 for the railroads had been arrived at. The rate of return allowed the roads by the Commission in 1923 was 5¾ per cent, but few railroad companies, if any, showed that return upon their investment in 1922. In determining rates, the Interstate Commerce Commission is required by the Transportation Act to give consideration to the transportation needs of the country and the necessity for enlarging the transportation facilities in order to provide the people of the United States with adequate transportation.

Federal and State Regulation. Transporation is a public function. Power to fix its rates so that they shall be fair to all concerned and to see that its service is sufficient and nondiscriminatory is as much a governmental prerogative and duty as the power of taxation. Not only does transportation precede and make possible the development of industry, trade, and commerce, but its rates and service also determine the location of industry, the radii of distribution, and the ability of one industry or one section of the country to compete with another in the same market. Government regulation of railroads may therefore be predicated, first, upon the public character and necessity of the service performed by railroads, and, second, upon the public's interest in and its right to reasonable and nondiscriminatory rates and efficient and equal service.

Prior to 1887, when the Interstate Commerce Act became effective, regulation of railroads by public authorities was exercised under state law only. Regulation of rates, facilities, service, and the issuance of railroad securities received little, if any, Federal control or review. In contrast with this condition, our transportation is today governed by comprehensive and somewhat rigid government regulations covering service, facilities, rates, public safety, and capital issues by both state and Federal legislation and administrative bodies.

The Transportation Act of 1920 definitely commits the country to the policy of private management and operation of railway systems. There is no clear line of

demarcation between the field of regulation and the field of management, but it is well to keep the distinction between the functions of regulation and management clearly in mind in considering the problems involved in transportation.

The Transportation Act was passed February 28, 1920, and became immediately applicable. The conditions under which it has operated have been abnormal and have not furnished a completely satisfactory test, either of its soundness or adequacy under normal operating conditions or of the relative efficiency of private operation and government operation. Indeed, it should be remembered in any attempt at such a comparison, based upon government control of railroads through the war period, that the conditions of government operation were also abnormal and consequently do not furnish a completely satisfactory test of the efficiency of complete government operation. It is clear, however, that the efficiency of either government or private operation is measured by the relative performance and cost of service, and that, measured by these standards, private management has shown itself to be superior to foreign government operation.

The power of Congress to regulate transportation rests upon the third clause of section 8 of Article I of the Constitution, which provides that Congress shall have power "to regulate commerce with foreign nations and among the several states and with the Indian tribes." This provision was agreed to in the Constitutional Convention without a dissenting voice. It grew out of the difficulties arising from the failure of the states to agree upon a uniform regulation of commerce under the Articles of Federation.

Prior to 1887 there was a great lack of uniformity among the carriers, both as to practices, rates, and methods of dealing with the public. The practice of rebating was extensively indulged in. This gave rise to many local laws and regulations, such as the granger laws in the various middle western states.

The first Federal legislation dealing with the regulation of interstate transportation was passed in 1887. This legislation created the Interstate Commerce Commission and gave it power to prevent discriminations between persons, communities, and localities, but did not confer the rate-making power; that is to say, the Commission was given the power to avoid a discriminatory rate, but not the power to establish a reasonable and nondiscriminatory rate in lieu thereof.

The evolution of the regulation of interstate commerce since 1887 and of the duties and powers of the Interstate Commerce Commission was accomplished by important changes in the Interstate Commerce Act from its passage in 1887 to and including the passage of the Transportation Act of 1920. The latter act, while greatly enlarging the powers of the Interstate Commerce Commission and thereby extending the scope of government regulation of the railroads, was fairly satisfactory to the carriers concerned and under its operation they were, in 1923, gradually recovering the stability and efficiency of prewar times. In the spring of 1923 the railroads of the United States were in fact handling the greatest volume of traffic in their history, and their program for the improvement of equipment and other facilities called for the expenditure in that year of more than $1,250,000,000.

Railways, Electric, lines of transportation operated by the motive power of an electric current, including street railways, interurban railways, and the electrified lines of certain steam railroads. Although some experiments were made as early as 1880, electricity was first successfully applied to street-railway operation in 1888, and within a few years practically all of the street railways of the United States had adopted electricity, wholly or in part, as a motive power. Construction of what are now termed interurban systems began in 1897.

In 1921 there were 838 electric street railway and interurban companies operating in the United States, with a total mileage of 47,555 miles. Their total revenue was reported as $709,825,092, and their net revenue less taxes as $211,473,743. The total number of passengers carried in a recent year was 14,506,914,573. On the surface lines in New York City in that year

over 326,000,000 passengers were carried, and on subway and elevated lines over 835,000,000. The Chicago surface lines carried in the same period 692,000,000 passengers and 164,000,000 on elevated lines, all operated by electricity.

As a result of the acute financial condition in which many electric railways found themselves during and following the World War, however, there resulted a financial reorganization in many cases, and in others the abandonment of operation in unprofitable districts. The records show that up to January 1, 1922, there had been a total of 5,548 miles of track of electric railways involved in receiverships and foreclosures. Operation had then been abandoned and the property junked in the case of 1,294 miles of track, while service had been abandoned on 784 miles.

Electric track construction is more expensive as a rule than that of steam roads, including as it does street paving and a heavier type of construction. In 1917 the investment of the electric companies in road and equipment was $114,563 per mile, as against an average investment of $76,495 per mile in steam roads. There has been little change in the investment in electric lines since 1917, largely due to difficulty in financing extensions or new facilities.

Many electric companies sell current for light and power. The power-plant equipment totaled 4,200,192 horse-power in 1917, of which 627,983 horse-power was produced by hydro-electric plants, 28,294 horse-power by internal-combustion engines, and the remainder by steam plants. The traffic handled by the electric lines is chiefly passenger traffic, the freight traffic being approximately 3.3 per cent of the total operating revenue.

The city railway companies fill an important place in the life of the communities they serve and cannot be supplanted by any other means of transportation. It is true that the introduction and use of the automobile has encroached to some extent upon the revenues of the street railway companies, but this competition has not seriously affected their revenues, on account of the growth of urban communities. The electric line is found most useful in affording service in densely populated city districts, traversing the cities in subways or elevated roads and by surface lines, giving fast and dependable service between points within the cities and between the city and suburban residential districts.

The operation of interurban electric railways presents an entirely different problem. While such lines are largely the extension of city lines, in many cases they are distinct transportation units, having been constructed with a view of serving certain outlying territory; and in some cases connecting the larger cities. These lines are also chiefly passenger-carrying railways. At first the interurban lines handled no freight, but very soon commenced handling what is ordinarily termed "package freight," on their passenger cars, more in the nature of express business than freight business. Gradually the freight business increased until after several years some of the roads began the operation of separate cars for freight. This business was and still continues in a large degree to be the handling of shipments from the wholesale houses in the larger cities to the smaller cities, towns, and villages, and even to country crossroad stops, and is popular among shippers and consignees on account of its quick delivery. The outbound freight handled is for the most part originated along the lines and is largely composed of the agricultural products of rural communities and the return movement of traffic incidental thereto.

In the West and particularly on the Pacific Coast, and in a few special instances in other sections, the interurban lines handle freight and interchange traffic with steam lines on practically the same basis as steam railroads. But by far the largest number do not interchange equipment and are therefore not in a position to offer inducements to industries to locate upon their lines, as they cannot afford direct and ready access to the general markets. The interurban lines, however, have a real place in the communities they serve. They afford fast and frequent service to passengers and enable the people dwelling in the rural communities to visit the towns 50 or 100 miles distant, and return home the same day. In the handling of package freight they give a

frequent and dependable service to the farm districts.

The total capitalization of all electric lines in 1917 was $5,532,223,818. Of this $2,473,000,000 was capital stock, $3,052,000,000 was funded debt, $7,197,895 in real-estate mortgages, and $166,592,228 floating debt. During that year, out of a total of 943 operating companies, 384 reported a net deficit on the year's operation.

The financial condition of the electric lines suffered during the war from the same difficulties that affected other public utilities. During the years 1921-1922, however, an improvement resulted from increases in rates and a downward tendency in cost levels. The sentiment of the public generally, according to the report of the Joint Commission of Agriculture, "is undoubtedly more favorable to the public utilities than for some years past; for it is now seen that the service demanded by the people cannot be given without reasonable payment therefor. Viewing the situation as a whole, it would appear that the electric lines will continue to fill a most important part in the transportaion needs of their communities."

See ELECTRIFICATION.

Railway Brotherhoods. There are in the United States at the present time several orders composed exclusively of employes of the railways. Among them are: Order of Railway Conductors, with offices in leading cities; Brotherhood of Locomotive Engineers; Brotherhood of Locomotive Firemen and Enginemen; Brotherhood of Railroad Trainmen; Order of Railway Conductors of America. In 1920, the Order of Railway Conductors had 54,344 members.

Rain, water falling in drops through the atmosphere. Air is capable of containing and carrying considerable quantities of moisture. When it has all the moisture it can carry, it is said to be saturated. The warmer the air, the more moisture it can carry, and the more it takes up by evaporation from the surface of open water, moist land, and everything green. Whenever moisture-laden air is cooled until it cannot hold all its moisture, the water settles down in the form of dew, mist, rain, snow, or hail. Whenever hot air, heavily laden with moisture, is cooled by contact with a cold wind, a shower or fall of rain is the inevitable result. The so-called cloudbursts which sometimes occur, especially in mountainous countries, with great loss of life and property, are caused by the coming together of a body of hot air containing a large amount of moisture and a chill wind.

The rainfall in different localities varies greatly. More rain is to be expected in the tropics, because evaporation is greater. The air naturally takes up more moisture from open water than from land. Other conditions being equal, localities near the sea and large lakes have a heavier rainfall than those which are inland. A forest or lake region in which evaporation takes place rapidly may be expected to have more rainfall than a dry or desert region. For this reason chopping away forests and turning grass lands into bare fields diminishes the supply of rain. As moisture has weight, even when it is invisible, low localities are more apt to have an abundant rainfall than mountain heights.

Winds have a great influence on the distribution of rain. A wind that sweeps over a moist country carries a supply of moisture to distant regions. A mountain barrier is a great obstacle to the distribution of rain. In passing over mountain ranges, winds are chilled and drop their moisture, so that the farther side of the range receives sometimes none at all. There is a region on the west side of the Andes, lying near the Pacific Ocean, which has almost no rainfall, because the prevailing winds blow from the east. Moisture from the Atlantic is deposited on the Andes, while moisture from the Pacific is carried away westward, so that this region gets almost none at all. A study of temperature, winds, and mountain ranges will show that the deserts of the world are occasioned either by distance from the sea or by intervening mountain ranges. In either case, the air loses its moisture before it arrives, or else it is so heated that it never cools below the dew point. The cool Mediterranean winds that blow over the Sahara are not devoid of moisture; but they grow hot as they travel southward, and have no opportunity to deposit their moisture.

So far as known, the greatest annual

rainfall occurs on certain southern slopes of the Himalayas, where the moisture-laden winds from Bengal Bay strike the mountains. The month of December is almost rainless, but during the summer the rainfall averages ten inches a day with a total rainfall for the year of over 500 inches. In one unusual season enough rain fell in the locality named to have formed a lake sixty-seven feet deep, had it not run off through the Ganges. As might be expected, such a torrent of rain sweeps the mountains bare of soil.

It is believed that there are no regions absolutely rainless. The average amount of rainfall the world over, counting both sea and land, is estimated variously at from forty to sixty inches. The evaporation requisite to maintain this amount of rain would dry up the ocean in from 10,000 to 15,000 years, if water did not find its way back again.

Rain making, or the causing of rainfall by artificial means, has long been a subject both of superstition and of scientific investigation. Most savage people whose living was at all dependent on what they raised had their rain dances and rain doctors, whose prayers, incantations, shaking of mysterious ingredients in a sack, beating of tom-toms, and the like, were supposed to have an influence on the clouds. More than one rain doctor's life has been saved and his reputation made by the timely appearance of a cloud; and very likely these pretended makers of rain knew enough about the approach of rainy seasons to time their efforts wisely. A theory was long prevalent that the heavy concussions accompanying the cannonading of battles caused rain; but it has been abandoned. It is still acknowledged that heavy rainfall has sometimes followed heavy cannonading, but there is no apparent explanation for the fact that the discharge of artillery is followed more often by dry weather. In 1891 Congress expended an appropriation through the department of agriculture in making experiments in Texas. Rain certainly followed the discharge of cannon, and a favorable official report was sent in to the department; but those who were in a position to know say that it had begun to sprinkle before the cannon were fired.

The following table gives the mean annual rainfall in inches for a number of representative localities:

Greytown, Nicaragua	260.
Astoria, Oregon	86.3
Bombay	70.3
Tokio	60.4
Manila	55.2
New Orleans	55.17
Sydney	49.86
Madras	48.69
Havana	46.5
Quebec	46.07
Glasgow	45.4
Halifax	45.34
New York	44.76
St. Louis	40.69
Montreal	39.28
Chicago	37.57
Toronto	34.4
Rome	30.6
Berlin	29.98
Liverpool	29.01
Dublin	28.4
Edinburgh	28.32
Algiers	26.72
Melbourne	26.6
London	25.
San Francisco	24.08
Vienna	23.42
Mexico	22.9
Moscow	21.1
Winnipeg	20.12
Paris	19.68
St. Petersburg	18.8
Denver	14.9
Santiago, Chile	14.1
Vladivostok	13.2
Yuma, Arizona	2.9
Cairo, Egypt	1.34

Someone with a gift for figures has computed the entire rainfall of the United States at 215,000,000,000,000 cubic feet yearly. Of this vast amount one-half evaporates, one-third flows to the sea, one-sixth sinks into the soil.

See DEW; HAIL; FROST; SNOW; RAIN GAUGE.

Rainbow, a beautiful arch of colors seen in the heavens during a shower. The center of the bow, the observer, and the sun are in a straight line. The bow is seen only when the sun is shining. The nearer the sun is to the horizon, the higher the arch of the bow. At whatever time of the day, it appears, of course, in that part of the horizon which is directly opposite the sun. This being the case, the observer must stand with his back to the sun. The cause of the rainbow is very simple, yet it is not easily understood. A part of the

white sunlight, entering each drop of falling water, is turned back by the farther side of the drop as though from a mirror, and returns toward the sun in a stream of different colored lights, violet, indigo, blue, green, yellow, orange, and red, the scientific name of which is a spectrum. The initials of the colors form the word *vibgyor*. Each drop sends back all these colors, but, in reality, the observer sees the violet rays from drops in a certain layer, the indigo from those in another, and so on. Two people a mile apart see a rainbow in apparently the same position; as a matter of fact, they see two entirely different bows. The truth is, the observer changes his rainbow every time he moves his head.

There is an old tradition that a pot of gold lies buried under the end of every rainbow, that the first to reach the spot may secure the treasure. Seeing that the rainbow flits with the observer, it is, of course, impossible to reach the end of it. The pot of gold is therefore perfectly safe. Rainbow chasing is a good deal like trying to step on the shadow of one's head. No matter how quickly a boy darts, his shadow has moved ahead before he can put his foot upon it.

The rainbow is without comparison the most beautiful natural phenomenon known. It attracted the attention of the earliest writers. No more beautiful interpretation has been given it, however, than that of the oriental nations who saw in the rainbow a promise that the shower should not turn into a flood.

I do set my bow in the cloud, and it shall be for a token of a covenant between me and the earth . . . and the waters shall no more become a flood to destroy all flesh.—*Gen. ix.*

A miniature rainbow may be seen by looking at the flame of a candle through a piece of glass dusted with lycopodium—the spore dust of a fern-like plant.

See LIGHT; SPECTRUM; MIRAGE.

Rain Gauge, an instrument used to measure the amount of rainfall at any given place. The Smithsonian rain gauge consists of a tube of brass, ten inches deep and three-fourths of an inch in inside diameter, fitted with a wide funnel-shaped mouth two inches in diameter. The depth of water collected is measured by a scale divided into tenths and hundredths of an inch. The moisture falling within a two-inch circle is collected in a small tube to secure greater accuracy of measurement in case of slight rainfall. A much coarser gauge is serviceable in case of a heavy rain.

Rainier, Mount, or **Mount Tacoma,** the second highest peak in the United States proper is a volcanic cone that rises from the Cascade Mountains in the southwestern corner of the state of Washington. The peak, 14,408 feet above sea level, is included in the Mount Rainier National Park. The slopes of the mountain are deeply eroded and are in part covered with forests, thus attesting to its great age and to the length of time it has been extinct. The largest glacier system in the United States is on the upper slopes of the cone, and at the foot is Nisqually Glacier.

Roads have been constructed and hotels built for the accommodation of the many who annually visit Mount Rainier. Numerous trails lead upward to the end of the timber belt, beyond which the climb is steep and dangerous.

Rainy Lake, a beautiful body of island-studded water that forms a part of the Ontario-Minnesota boundary, is about 130 miles north of Duluth, Minn., and 145 miles west of Lake Superior. The lake is about 50 miles long and averages 5 miles in width, the total area being about 300 square miles. By the Rainy River, Rainy Lake is connected with Lake of the Woods.

The shores of Rainy Lake are rocky and are forested with coniferous trees. The lake abounds with whitefish, pike and pickerel, and big game is plentiful. It is easy of access, for the Canadian Northern Railroad crosses it near the center.

Raisin, the name given to a dried grape. The raisin industry probably began in southern Asia and spread westward; in historic times almost all the countries bordering the north coast of the Mediterranean have been raisin producers. European Turkey, Greece, Italy and Spain are important raisin producers, and in the United States California is the great producer. The finest California raisins do not suffer by comparison with those produced in any other country.

The best raisins are produced from those grapes that contain the greatest amount of sugar, and both the seed-containing and seedless varieties, white, red or purple, are used. All raisins are sun dried, the curing process requiring from ten to thirty days. One method is to cut the stem about two-thirds of the way through so as to stop the flow of sap, and then allow the bunches to cure while hanging on the vine. The finest quality of raisins is produced in this way. The other method is to spread the bunches on shallow trays, turning them from time to time in order that all sides may be exposed to the sun. When thoroughly cured they are dumped into bins to await sorting and packing. In the most modern California raisin packing plants almost all work is done by machinery. California produces upwards of 400,000,000 pounds annually.

The average carbohydrate content of raisins is 76 per cent (see CARBOHYDRATE), and a pound of first quality raisins has a fuel value of about 1,445 calories.

Raisin River, Massacre of, the name given to a massacre committed at Frenchtown (now Monroe), Michigan, during the War of 1812. General Winchester sent a detachment of Kentucky troops to expel the British from Frenchtown; the move was successful, and Winchester moved all of his men into the village. In a surprise attack General Proctor, commanding a force of 1,500 British and Indians, forced Winchester to surrender. Proctor withdrew, taking with him all able-bodied prisoners and leaving the sick and wounded to the promised care of the Indians. But the Indians had planned a massacre and all prisoners who were left behind were murdered. Throughout the remainder of the war the battle cry of the American forces was "Remember the River Raisin."

Raisuli, a Moorish brigand born about 1867. In 1904 he attacked Tangier, and being captured, took revenge later by kidnapping Ion Perdicaris, and his stepson, American and British subjects respectively. He then made heavy demands on the government. A ransom of $70,000 and the governorship of Tangier was obtained. Two years later he was deposed, and in 1907 he withdrew to the mountains after frequent attacks by the forces of the sultan. An attempt was made to bring him to terms but he held the envoy, Sir Harry Maclean, for ransom. Finally, in reply to his exorbitant demands, England pledged Raisuli safety and promised to pay him a ransom of $100,000.

Rajah, rä′jä, or **Raja,** a title of the princes of the Hindu race. They are independent rulers, but the term was also assumed as a title by landowners of inferior caste. It is now an honorary title, and those princes who are in authority use the title maharajah, meaning "great rajah," or "great king."

Rajputana, rahj poo tah' na, a division of India, namely the north-central part, which was originally made for political purposes. It surrounds Ajmer-Merwara, and is known as Rajputana Agency. This locality is said to embrace 128,987 square miles, divided into two physical regions, necessitated by the Aravalli Hills, which form a natural break between the northeastern and southwestern parts.

The population consists of Hindus and Mohammedans, with a very small number of Europeans, mostly British.

The physical character of the territory is not suitable for vegetation, being dry and rocky, but in the more fertile lands of the southeast, such products as barley, corn, cotton, hemp, millet, indigo, sesame, tobacco, rice and wheat are grown. This fertility is due largely to the Chambal River, which drains the southeastern section of the division.

The raising of cattle, sheep and camels is also an occupation of considerable importance.

Rajputana is divided into eighteen states, and two chiefships, occupied by native rulers. An officer styled the agent to the Governor-General represents the British government. Under him are eight political charges, consisting of Mewar Residency, Western Rajputana States Agency, Jaipur Residency, Haraoti and Tonk Agency, Eastern Rajputana States Agency, Kotah-Jhalawar Agency, Bikaner Agency and Alwar Agency.

The native of Rajputana, the Rajput, is a Hindu, who claims descent from the

feudal conquerors of Western Hindustan. Although the Rajputs are most numerous in their city of Rajputana, they inhabit also Gujarat; and many years ago they exercised great influence in Lower Sind.

Raleigh, raw'lĭ, **Sir Walter** (1552-1618), an English courtier and soldier. He was a native of Devonshire, and resided for a time at Oriel College, Oxford. The qualities of a fighter, a patriot, and a courtier seem strangely mixed. He was a bitter opponent of Catholicism, and especially of the power of Spain. When a youth of seventeen he fought for the French Huguenots in France. The last public act of his life was an attack on a Spanish village at the mouth of the Orinoco in South America.

When a young gallant, he entered public life through the favor of Elizabeth. In 1584 Elizabeth gave him a patent, practically a deed, to any unoccupied territory he might find in the New World. He sent ships under Amidas and Barlow to explore the American coast, to which he gave the name of Virginia in honor of the Virgin Queen. The next year he sent out a colony. A settlement was made on Roanoke Island, but the colonists spent their time in looking for gold instead of planting a crop. They were brought home to England in 1586 by Drake. Raleigh sent a second colony to Roanoke. Three years later ships sent out found that the colonists had disappeared entirely. There was a tradition that they were adopted by an Indian tribe, but nothing is known certainly of their fate.

Nevertheless, Elizabeth was delighted with Raleigh's efforts to found a commonwealth in the New World. She made him a knight, and, in order to make him rich, gave him a monoply of the trade in sweet wine. Raleigh was granted a tract of land in Munster, Ireland. He introduced the cultivation of the potato, a plant recently brought from the New World. He is said to have introduced the use of tobacco in England. There is a story, probably unfounded, to the effect that his servant, seeing him for the first time smoking, threw water over him thinking him on fire.

Raleigh was one of Elizabeth's advisers in the preparation of the fleet which defeated the Spanish Armada, yet toward the close of her reign he fell into disgrace and narrowly escaped with his life. When James I came to the throne, he distrusted Raleigh. The latter was arrested for treason and was held in the Tower for twelve years. During this time he busied himself writing, his most important work being a *History of the World.* On his release he set sail for the New World in search for the famous Eldorado, a supposed country of gold. Although he had been warned not to provoke hostilities with Spain, a part of his forces attacked a Spanish village on the Orinoco. On his return to England a sentence of treason, which had been hanging over him for several years, was put into effect and he was executed on the scaffold.

See ARMADA; ELDORADO.

Raleigh, the capital of North Carolina. It is a manufacturing city of importance, among the products being cotton textiles and cottonseed oil, flour, phosphate, machinery, foundry products, woodwork, artificial ice, cigars, carriages and farm implements. Raleigh is beautifully laid out, with a large public square at the center, in which is situated the granite capitol. There are numerous other state institutions, a hospital, an old ladies' home, two orphanages, and several libraries. It is quite an educational center. Peace Institute, Meredith College, a Baptist university for women, the state agricultural college, and Shaw University are here; the state university, Trinity College and Wake Forest College are nearby. The population in 1920 was 24,418.

Ralph Royster Doyster, the earliest English comedy. It was written by Nicholas Udall. The exact date of its appearance is unknown, but it was sometime before 1551. It is divided into acts and scenes, and thus shows an advance in dramatic form over the miracle plays of the time. Udall wrote the play to be presented by the boys of Eton College. It was printed in 1566.

Ramayana, rä-mä'ya-na. See SANSKRIT.

Rambler, The, a periodical published in London by Dr. Samuel Johnson, 1750-52. It was issued twice each week during these two years. It would seem to have been an attempt to revive the periodical style of literature so popular in the days of Addison's *Spectator.* *The Rambler* dealt with

a wide range of subjects, treated for the most part in a serious tone. Collected into book form, *The Rambler* had a large circulation and exerted considerable influence. See JOHNSON, SAMUEL.

Ramée, dē lä-rä-mē′, **Louise de La,** (1840-1911), an English novelist of French extraction. She is known commonly by her pen name of Ouida (o͞o-ē′da). She adopted this name when she began writing for periodicals, taking it from the pronunciation of her own name by a baby sister. Her novels include *Held in Bondage, Under Two Flags, Two Little Wooden Shoes, The Waters of Edera, Street Dust,* and *Strathmore.* Ouida's novels contain an excess of sentiment. They are dramatic, however, and not without literary qualities. *A Dog of Flanders* and *The Nuremberg Stove* are short stories of child life which are classic.

Rameses II, one of the greatest of the Egyptian Pharaohs. He died 1280 B. C. He is the ruler who oppressed the Hebrews, requiring them to make bricks without straw. He extended the rule of Egypt northward into Syria and southward into Ethiopia, and occupied the country later known as Palestine. He built a defensive wall from the Mediterranean to the Red Sea east of the present line of the Suez Canal. For an account of the splendor of his capital, see article on THEBES. A glimpse of the miserable condition of the peasantry is afforded by the following note from an Egyptian writer of that day:

> Dost thou not recall the picture of the farmer, when the tenth of his grain is levied? Worms have destroyed half of the wheat, and the hippopotami have eaten the rest; there are swarms of rats in the fields, the grasshoppers alight there, the cattle devour, the little birds pilfer, and if the farmer lose sight for an instant of what remains upon the ground, it is carried off by robbers; the thongs, moreover, which bind the iron and the hoe are worn out, and the team has died at the plow. It is then that the scribe steps out of the boat at the landing place to levy the tithe, and there come the keepers of the doors of the granary with cudgels and the negroes with ribs of palm-leaves, crying: "Come, now, corn!" There is none, and they throw the cultivator full length upon the ground; bound, dragged to the canal, they fling him in head first to work out his tax; his wife is bound with him, his children are put into chains; the neighbors, in the meantime, leave him and fly to save their grain.

See EGYPT; PHAROAH.

Ramie, răm′ē, a Chinese shrub about the height of a man, allied to the nettles. It is cultivated like hemp, except that the roots once set produce an annual clump of stalks indefinitely. Its inner bark, like that of the nettle, yields a strong, durable, silky fiber, widely used by the Chinese in the manufacture of suiting, dress goods, and upholstery. It is so fine and delicate that it may be used with silk or alone in the weaving of curtains, embroideries, and fine laces. It is so strong that it makes excellent thread, fishing nets, and cordage of all sorts. For table damask, napkins, handkerchiefs, and window curtains, it is second only to linen. Ramie velvets and plushes are praised for the softness and fineness of their texture. It also makes an excellent paper, well suited for bank notes. The French government uses no other. Ramie cloth is the basis of the incandescent gas mantle. Though introduced but recently into this country, it is evident that ramie goods are to be in high favor. See RAFFIA; SISAL; HEMP; MANILA; NETTLE; JUTE.

Ramsay, Alexander (1815-1903), an American politician, United States Senator, and governor of Minnesota. He was born in Harrisburg, Pennsylvania, and began to practice law there in 1839. In 1843 he was sent to Congress as a Whig. He was governor of Minnesota Territory from 1849 to 1853, mayor of St. Paul for a couple of years, and the second governor of the state serving two terms. From 1863 to 1875 he was in the United States Senate; and was secretary of war from 1879 to 1881. At the opening of the Civil War he was the first governor to respond with volunteers to Lincoln's call for troops.

Ramsay, răm′zĭ, **Allan** (1686-1758), a Scottish poet. He was the son of a Lanarkshire mine manager. At fifteen he went up to Edinburgh to learn the trade of barber, then, owing to the wearing of wigs, an extensive and lucrative business. He became acquainted with a band of young men who aped the manners and morals of the corrupt court of Charles II. They admitted Ramsay to the Easy Club, an organization that professed to include the wit, literary ability, and gallantry of the

town. A favorite topic of these critics was the need in pastoral poetry of greater fidelity to nature. The *Guardian* for April 7, 1713, No. 23, said, "Paint the manners of actual rustic life, not the manners of artificial shepherds and shepherdesses in a fictitious golden age: use actual rustic dialect: instead of satyrs and nymphs, introduce the supernatural creatures of modern superstition," that is to say, fairies, brownies, etc. In response to this call, Ramsay wrote *The Gentle Shepherd,* one of the few successful poems written according to a recipe. For the artificial subjects of the time it substituted the real life of Scotch shepherds. It attracted attention from the scholar and became a household favorite. It was written in a tone of loose morality, true enough, no doubt, to nature, but it was bitterly assailed as bringing the atmosphere of the cavalier into the precincts of the Scottish kirk. "Renowned Allan, canty callan," had a deep influence on Burns, who wrote in the same dialect and adapted the same rollicking cavalier tone, as may be seen in *The Jolly Beggars, Tam O'Shanter,* etc. Ramsay exchanged the business of wig making for book selling. He was a tireless collector of old Scottish poetry. He established the first circulating library in Scotland. Among other works by his hand were *Evergreen,* a collection of poems regarded as the precursor of Percy's *Reliques,* and a collection of fables. A son attained a degree of eminence as a painter of portraits, some of which are now in the National Portrait Gallery and the gallery at Edinburgh.

Ramsay, Sir William (1852-1916), a Scottish chemist. He was born and educated in Glasgow, and in 1887 after seven years of teaching at Bristol, he became professor of chemistry at University College, London. In 1894, together with Lord Rayleigh, he discovered argon, and later he discovered helium. He gave the names neon, xenon, and krypton to previously unknown elements in the air, and in 1903 he declared the helium emanates from radium. The following year he was given the Nobel prize in chemistry. He wrote a treatise on *The Gases of the Atmosphere; The History of Their Discovery,* and translated Beilstein's *Qualitative Analysis.*

Randall, Samuel Jackson (1828-1890), an American statesman. He was born in Philadelphia, and early engaged in the wholesale iron business in that city. In 1858 he was elected to the state senate, and four years later he became a member of Congress, serving as congressman until his death. He was speaker of the House from 1876 to 1881. He presided during the disputed presidential election of 1876, and disapproved of the proposed settlement by electoral commission. He was a member of the Committee on Rules, and chairman of the Committee on Appropriations. He opposed tariff reform and favored protection, despite the fact that he was a Democrat. He became known as a parliamentarian, an able political orator, and a man who was wise in the management of public affairs.

Randolph, răn′dŏlf, **Edmund Jennings** (1753-1813), an American statesman. He was a native of Williamsburg, Virginia, and was educated at William and Mary College. Virginia sent him to Congress and made him governor. He was a member of the convention that framed the Constitution of the United States and, though it did not please him, he recommended its adoption. When the national government was established, Washington made him his first attorney-general. In 1794 he succeeded Jefferson as secretary of state, but, finding that he did not enjoy the confidence of the president, he resigned and retired to the practice of law in his native state.

Randolph, John (1773-1833), a distinguished American statesman. He belonged to an old, wealthy, influential family of Virginia. By way of distinction from the many other members of the family, he was known as Randolph of Roanoke. He was reputed to be a direct descendant of Pocahontas. He was educated at William and Mary, Princeton, and Columbia. He took up the practice of law. In 1799 he entered Congress. He denounced the Alien and Sedition Laws and opposed the War of 1812. During Jackson's administration he was minister to Russia, yet upheld Calhoun against Jackson in the nullification controversy. He was a tall, slender, dark complexioned man, with a keen, high, shrill voice and long, thin hands. He had a habit

of shaking his forefinger at his opponents when speaking excitedly. He was a man of eccentric ideas and great originality. He despised the Northern men who compromised with slavery, calling them "doughfaces." When Adams of New England and Clay of Kentucky formed an alliance, Randolph stigmatized it as "a combination of Puritan and blackleg." Clay challenged him to a duel. He accepted, fired his gun into the air, and offered Clay his hand. He was never married. At his death he freed 318 slaves and left property enough to start them off in life. See POCAHONTAS.

Randolph, Peyton (1723-1775), an American statesman. He was a native of Williamsburg and was graduated at William and Mary College. He held a lucrative position from the king as royal attorney to the colony. He was nevertheless one of the leading spirits in exciting the Revolution. In 1764 he was an active member of the Virginia House of Burgesses that memorialized the king against the passage of the Stamp Act. When Massachusetts sent out a call for concerted action to oppose the encroachments of royal authority, Randolph was one of the foremost to induce Virginia to respond cordially. He was a member of the First Continental Congress and was chosen unanimously its president.

Rangoon, the capital of Burma. It is situated on the Rangoon River, near the sea, in the region east of the mouth of the Irawadi. The site is elevated. The city was founded by a Burmese ruler in 1753. It passed into the hands of the British in 1852. Broad boulevards and well built churches, schools, colleges, hospitals, museums, a town hall, and custom house give the city a modern appearance. Large shipments of rice, cotton, timber, ivory, horns, precious stones, and other articles, to the value of $50,000,000 a year, are made. A railway has been built into the interior as far as Mandalay. One of the features of the city is an oriental pagoda. The base is many sided, and is about 400 feet in diameter. The roof, having a corresponding number of sides, is carried up in an incurving cone to a sharp finish 300 feet high. The base is surrounded by a number of small pagodas which make the central building seem all the larger.

Rank. See PRECEDENCE.

Ranunculus. See BUTTERCUP.

Ranz de Vaches, ron dā väsh, the strain which the Alpine herdsman blows on his alpenhorn when he drives out his herds from the valleys to the higher pastures. The words mean, "chime of the cows." The air is simple and somewhat irregular, but, as it echoes in the mountains, produces a striking and very pleasing effect.

Rape of the Lock. See POPE, ALEXANDER.

Raphael, răf'a-el, **Sanzio** (1483-1520), the greatest of Italian and of all painters. Like Michelangelo he won reputation as an architect. He designed certain portions of the Vatican and painted two series of wall decorations for this famous building. First is a series of fifty-two pictures, representing the principal events of sacred history. They are sometimes called "Raphael's Bible." The other series includes the *Coronation of Charlemagne,* the *School of Athens, Parnassus, Jurisprudence,* the *Deliverance of St. Peter,* and many subjects drawn from papal history. Michelangelo worked in solitude. Raphael delighted to go to his work with a host of students whom he employed in executing the less critical parts of his paintings. In this way, although he died young, Raphael left scores of paintings, any one of which would have made the reputation of an inferior artist.

Raphael is known best by two famous Madonnas. His *Madonna of the Chair* sits clasping her chubby child. Her cheek rests on its curly head, and her eyes look straight forward in a wistful, womanly way. The child's face is burdened, as if a forecast of his life as a "Man of Sorrows" already weighs heavily. The other painting, *The Sistine Madonna,* was secured by purchase for the Dresden gallery in 1753 for $45,000. This picture is eight feet by four feet in size. It is surrounded by a heavy gilt frame and is shown in a room by itself. A curtain, seemingly drawn aside, reveals the mother issuing forth from the clouds of heaven with the infant Christ in her arms. Two saints in rapt adoration gaze upon the apparition, and two innocent cherub faces at the foot of the picture add a third horizon giving the Madonna and Child the effect of distance. The Madonna's large awe-strick-

en eyes and modest, serious, lovely face are the highest expression of womanly purity and the solemn joy of young motherhood.

Visitors may chatter in other parts of the gallery, but even the thoughtless feel the influence of *The Sistine Madonna.* Both of these Madonnas are well known through inexpensive prints. Raphael's supremacy in the world of painting has been undisputed for four centuries.

See PAINTING; DRESDEN.

Rationalism. See PHILOSOPHY.

Rappahannock, a river of Virginia, rises in the Blue Ridge Mountains, and flows generally southeastward for 250 miles, emptying into Chesapeake Bay about 20 miles south of the mouth of the Potomac River. The stream is navigable to Fredericksburg, where there is a fall that is a good source of water power. The most important affluent is the Rapidan River.

Raritan River, a river of New Jersey, is formed by the junction of two streams that rise in the northern part of the state. Its general direction is souheast and its length is 75 miles. To the fall line at New Brunswick, it is navigable, and at this city it is a good power source. At its mouth in Raritan Bay is the manufacturing city of Perth Amboy.

Raspberry, răz'bĕr-ry, a popular fruit-bearing bramble. The fruit differs from the blackberry chiefly in separating from the receptacle when ripe. The drupelets of the raspberry come away from the receptacle in a cup-shaped fruit. In reality the fruit is not a berry at all. A berry, as a grape, a tomato, a cranberry, a partridge berry, a currant, or a gooseberry, contains more than one seed. Fruits with one hard seed, as a plum, peach, cherry, elderberry, are stone fruits. A raspberry, like a blackberry, is really a collection of small stone fruits. Our red and our black garden raspberries are derived from native plants of eastern North America. The "fire raspberry" from Japan is cultivated for its ornamental autumn foliage, and the Rocky Mountain raspberry, for its fine white flowers. See BLACKBERRY.

Rat, an animal of the mouse family. There are numerous species. The common or brown rat is a native of India. It has extended its range within comparatively recent times. It arrived in England about 1750, and was first reported in this country about the time of the American Revolution. It breeds several times a year and is an exceedingly destructive animal. The Florida or cave rat and the cotton rat of Southern States are well known in their respective sections. They remain in fence rows and outlying grounds, however, and do not infest buildings. A smaller black rat, with habits somewhat like the brown rat, and likewise a native of India, is so persecuted by its larger relative that it is comparatively rare. There are also several water rats; one in particular, called the wharf rat, which infests harbors. Rats are good swimmers, but they cross large bodies of water, in ships of course. A superstition, once prevalent among sailors, that rats desert an unlucky ship when it is in harbor, has found expression in the saying, "Rats leave a sinking ship." Seattle, Washington, requires boats in port to place flaring tin shields on the mooring ropes to prevent rats from coming ashore. The harbor of Hamburg, Germany, is provided with a steam tug that goes to infested ships and pumps carbonic acid gas into the holds to destroy the rats.

The spread of the plague in India has been traced to rats. The plague that has so often devastated India and other Oriental countries, that has at various periods swept over Europe, appeared in San Francisco in 1907. The war against this plague was conducted on the lines of a military campaign. A large map of San Francisco was obtained and every case of plague developing was marked upon the map. It was found that rats formed the principal source of infection.

In this way it was possible not merely to treat existing cases but to prevent spread of the disease. The most prolific causes for the extension of the plague were found to be decaying masses of refuse, filthy stables, and lack of ratproof building material. Therefore, after exterminating as many of the plague carriers by poison and trapping as was possible, the commission started in to clean up the city. Sanitary garbage cans with closefitting covers were insisted upon; concrete floors and side walls for stables, at least one and one-half feet

Norway or brown rat.

Black rat.

Field mouse (Europe).

Domestic mouse.

Hamster.

Musk-beaver.

Lemming.

Egyptian jumping mouse.

RATS AND OTHER RODENTS.

above the ground were made peremptory; the elevation of frame structures above the ground was advised; and to prevent a recurrence of the plague in the future, all wharves were to be built of stone and concrete. The people of San Francisco coöperated heartily with the commission in its work, and the result was to show the world that not only could the ravages of the plague be reduced to a minimum, but that given proper sanitary measures, it is altogether preventable.

Under favoring circumstances rats have young every three or four months. If unchecked, a pair of rats is capable of establishing a colony of 20,000,000 rats in four years. In spite of cats, traps, poisons, terriers, and ferrets, rats have multiplied enormously in the ports and grain fields of Europe and Asia. A British officer investigating the cause of plague in Bombay declared that there were at least 2,000,000 rats in the wharves of that city alone. Almost in despair, the governments of Europe have set scientists at work to discover some possible means of exterminating rats. Two eminent scientists, Dr. Danysz of the Pasteur Institute of Paris and Dr. Neumann of Arlborg in northern Europe, have hit upon practically the same measure. They have discovered a bacillus, a bacterial germ which is harmless to human beings and to other animals, but which is fatal to rats and mice. A preparation containing this microbe was distributed throughout infested fields in France. The rats and mice disappeared immediately. Birds and other animals that ate the dead rats seemed to experience no evil effects. The Russian grain port of Odessa was infested with rats. The authorities applied to the Pasteur Institute for aid. Five thousand gallons of bouillon were prepared. Pieces of stale bread soaked in the bouillon were spread about the wharves and elevators. In a few days the authorities offered ten cents a head for every rat caught, but even professional ratcatchers were unable to find specimens. In eight weeks only fourteen rats were found where a million rats lived before. Equal success has been met in Germany and in Sweden. The Danish government established a laboratory at Copenhagen to supply the microbes to agricultural districts.

A very interesting account is given of a systematic attempt to rid the villages and fields of Suffolk, England, from rats and mice. At a given date, the infection was supplied in quantities. Bands of men and boys distributed rat food infected with the microbes everywhere. In a few days the entire locality was seemingly free from the gnawing, destructive pests.

A report issued by an English association, called "The British Incorporated Society for the Destruction of Rats," claims that a rat eats a half cent's worth of food per day, and that a colony of rats on an English farm causes a loss to the proprietor of $1.80 per year each. The total loss to the agricultural interests of Great Britain from ravages of rats is placed at $75,000,000 a year. Great Britain and its colonies spend a million dollars in buying rat poison. Rats are not only destructive, but they are a nuisance. They appear to have no compensating good qualities to justify their existence. If the so-called rat virus can be supplied through the drug stores in capsules, it would seem that persistent effort might rid the civilized world of both rats and mice.

The rat is not a sufficiently inspiring subject to find large place in literature. Robert Browning's poem of *The Pied Piper of Hamelin* gives a very excellent notion of the rat plague in the Hanse towns of medieval Europe. The following quotation gives some notion of the kinds of rats, as well as of the great numbers that infested European cities:

Out of the houses the rats came tumbling—
Great rats, small rats, lean rats, brawny rats,
Brown rats, black rats, grey rats, tawny rats,
Fathers, mothers, uncles, cousins,
Families by tens and dozens,
Brothers, sisters, husbands, wives—
Followed the piper for their lives.

The high, wet levels swarmed with mice and shrews, just as our arctic and alpine meadows swarm with them. The species were really widely different from ours, but many of them showed curious analogies in form and habits; there was a short-tailed shrew much like our mole shrew, and a long-haired, short-tailed rat like a very big meadow mouse. They were so plentiful that we frequently saw them, and the grass was cut up by their runways. They were abroad during the day, probably finding the nights too cold, and in an hour Heller trapped a dozen or two individuals, belonging to seven species and five different genera.—Theodore Roosevelt in *Scribner's Magazine.*

Rathenau, Walther (1867-1922), German statesman, scientist and philosopher, the son of Emile Rathenau, one of the outstanding figures of his day in industrial Germany, and the founder of the "A.E.G." (General Electric Company), was born in Berlin.

As a young man, Rathenau had studied chemistry, physics, philosophy and letters, and at the age of 26 had formulated a method for obtaining alkalies, and establishments for this work were built in Germany, France, Switzerland and Poland. Upon the death of his father, young Rathenau succeeded him and became the head of the enormous "A. E. G." interests. During the World War he was head of the commission for supplying all kinds of material, and became practically dictator of the whole industrial and trade organization of Germany. When young, Rathenau was in doubt whether to choose science or letters as his life work, but decided on the former. He won a doctor's degree in the field of electrical engineering, and became a captain of industry in the electrical business.

Before entering upon public life, Dr. Rathenau wrote about 20 books on science, esthetics and morals, one of which, *Von Kommenden Dingen* which has been translated into English, has reached its 75th edition. His ideals embraced a world order where it should be required, within certain fixed limits of application, that every employe engaged in mechanical work should do a portion of his day's work in intellectual employment, and that every brain worker should be obliged to devote a portion of his day to physical labor. He also longed for a return to seriousness and the simpler life. Dr. Rathenau was Minister of Foreign Affairs of the German Republic when he was assassinated.

RAZOR, SAFETY. The first safety razor was merely a straight razor with a guard attachment designed to prevent the cutting of the flesh. Later, the safety razor with a detachable handle and a short, thin, flexible blade was made and became very popular. Many types of safety razor are on the market, all made on the same general principle; some are inexpensive while others are silver, or even gold, plated.

Rationalism. See PHILOSOPHY.

Ratisbon, răt'ĭz-bon, a city of Bavaria. It is beautifully situated at the confluence of the Danube and the Regen. It was a strongly fortified military post of the Romans, and later a free imperial city. From 1663 to 1806 it was the seat of the German Imperial Diet. From the eleventh to the fifteenth century it was the most prosperous and populous commercial city in southern Germany. The city still retains its medieval architecture. Along the so-called Street of Ambassadors are numerous residences once occupied by members of the Diet. Some of these still have the armorial bearings of their ancient owners. Some of the more important residences still possess towers of defense erected by the medieval nobles. The Cathedral of Ratisbon resembles that of Strasburg in outward appearance. It is celebrated for its chief portal and a curious portico. It possesses good stained glass. A decided architectural feature is the Asses' Tower, containing a winding, inclined plane which serves as a stairway. Another building of interest is the city hall, containing a rich apartment in which the Diet or German Parliament used to meet.

The Walhalla, or German Temple of Fame, is a magnificent modern edifice completed in 1842 at an expense of $6,000,000. In its exterior form it resembles the Parthenon of Athens. It is surrounded by fifty-two fluted Doric columns. It is constructed chiefly of unpolished gray marble.

Rattan, the stems of certain palms. We are so apt to think of stately palm trees that it is a surprise to read of a slender, trailing, creeping, climbing palm; but some of the East Indian palms have vine-like stems, 20 to 1,000 feet in length, which produce leaves at joints or nodes only. Sometimes a stem runs for 100 feet with only a tuft of leaves at its end. These vines vary from the diameter of a knitting needle upward. They are cut into pieces, five to twenty feet long, bound into bundles, and shipped as rattan. See PALM.

Rat Terrier. See TERRIER.

Rattlesnake, a venomous serpent of America, allied to the viper, moccasin, and copperhead. The tail of the rattlesnake is provided with horny rings that rattle together when shaken. The number of

rings increases with age, but not with regularity. The rattlesnake has no regular teeth, but possesses a long poison fang on each side in front, at the roots of which are poison sacs. These teeth lie flat when the animal is not enraged. When disturbed the rattlesnake throws himself into a coil, shakes his rattles, and darts at his enemy.

We have fourteen species in North America. One species is confined to the Pacific coast. Five species are found only in the southwest or near the Mexican border. The diamond rattlesnake, so named from three rows of diamond-shaped areas on its body, is the largest species of all. It attains a length of eight and one-half feet and an extreme body girth of fifteen inches. It is at home among the palmetto palms of Texas and the Gulf States. The prairie rattlesnake belongs to the Great Plains. This is the species that haunts the old burrows of the prairie dog. The common or timber rattlesnake is found in rocky localities from New England to the Rocky Mountains and southward.

Raven, a bird of the crow family. It is distinguished by its large size and hoarse croak. The European raven nests in rocky ledges and lives on fruits, nuts, snails, and, not infrequently, on helpless young hares and lambs, or even carrion. Barnaby Rudge and his raven afford Dickens an opportunity for some fine passages. Very likely Poe had the same species in mind when he wrote *The Raven.* The American or northern raven is of local distribution, ranging from Alaska and Greenland to British Columbia and North Carolina. It is found locally at interior points. It has a length of twenty to twenty-seven inches and a wing expanse of about forty inches. From two to seven bluish green eggs with olive markings are placed in a stick-built, grass-lined nest in some tree or on a cliff. No complaint has been lodged against the habits of this solemn, long-winged denizen of the far-off woods. In Scotland the raven is called a corbie. The European raven is a much tamer bird than the American raven. Both species are "as black as a crow." See CROW.

Ravenna, a city of northeastern Italy. Venice and Ravenna occupy similar positions—the former north of the mouth of the Po, the latter south—save that the lagoons of Ravenna have filled with silt, leaving the city five miles inland. The ancient walls still bear iron rings to which ships were once moored. Communication with the Adriatic is maintained by a canal. The city has manufactures of lace, wine, and implements; but interest centers chiefly in its history. In the fifth century the Emperor Honorius, being alarmed by the inroads of Alaric, thought it well to take up his residence here within the protection of the lagoons. Ravenna was the chief seat of the Roman emperors for three quarters of a century. "Here Stilicho was slain; here Honorius and his sister caressed and quarreled; here Valentinian spent the greater part of his useless life; here Marjorian was proclaimed; here the little Romulus donned his purple robe, and here, in the pine wood outside of the city, Pontus received his decisive defeat from Odoacer." The last named ruler surrendered the city to Theodoric the Ostrogoth. Ravenna was the last spot to which the Ostrogoths clung in Italy.

Ravenna is a city of ancient churches. There are no less than thirteen dating between 370 and 535. They are built on the basilica pattern. Beautiful rows of marble pillars, long series of arches, fresco paintings undimmed by the centuries, and mosaics testify to the former wealth of the city and its devotion to Christian art. Charlemagne got the plan of his cathedral at Aix-la-Chapelle here. Dante died and was buried here. Byron, who lingered here in 1820-1, when he should have been elsewhere, wrote of the great poet's marble urn as a "cupola more neat than solemn."

Rawlinson, George (1815-1902), an English historian and orientalist. He was born in Chadlington, Oxfordshire, was graduated from Oxford, and received a tutorship in Exeter College. In 1861 he was made Camden professor of ancient history. Though he had taken orders, he was unable to continue in his chosen profession because of difficulty in speech and his pulpit at All Hallows, Lombard Street, London, was generally filled by substitutes. His chief works are the following: *The Five Great Monarchies of the Ancient World; The Sixth Great Oriental Mon-*

archy; The Seventh Great Monarchy; The Origin of Nations; History of Ancient Egypt; Egypt and Babylon from Scripture and Profane Sources; Ancient History; A History of Phoenicia; and *Isaac and Jacob.*

Ray, John (1628-1705), an English botanist. A graduate and fellow of Cambridge. He established the ascent of sap, and divided plants into flowering and non-flowering; the flowering plants he divided into one-leafed or two-leafed plants; this was the beginning of a right system of plant classification. See LINNAEUS; JUSSIEU.

Rayleigh, rā′lĭ, **John William Strutt, Baron** (1842-1919), an English physicist. He graduated from Trinity College, Cambridge, and was appointed professor of experimental physics in 1879. He succeeded Tyndall to the chair of natural philosophy in the Royal Institution in London, was made secretary of the Royal Society in 1887, and in 1896 was appointed scientific adviser to Trinity House. His name

Razor, an instrument used for shaving off the beard or hair. Razors are keen edged, with thin blades and concave sides, and are made of a fine cast of steel. The handles are made of bone, horn, silver, ivory, etc., and they protect the blade when the tool is closed. Razors were in use among the Egyptians, and many Jews observe the old Levitical code which forbade the use of the razor, and substitute scissors.

SAFETY RAZOR. The first safety razors made were ordinary straight razors with a guard attachment to prevent the user's cutting the flesh of the face and neck. A few razors are still made on this general principle. Later appeared the safety razor with a short, double-edged, flexible blade and a detachable head; this has proved the most popular of the many kinds of safety razors.

Read, Opie Percival (1852-), a well known American journalist, novelist and humorist, was born at Nashville, Tenn. After a brief period of schooling, he secured a position as reporter on a Franklin, Ky., newspaper. From 1878 to 1881, Mr. Read edited the *Arkansas Gazette,* Little Rock, Ark., and in 1883 founded the now famous paper *The Arkansas Traveller,* a humorous sheet that he conducted until 1891. Since then Mr. Read has been engaged in literary work in Chicago. Some of his novels are heavily overlaid with delightful local color, and some of his characters are engagingly odd. Among his published works are *A Kentucky Colonel, A Tennessee Judge, Old Ebenezer, An American in New York, Turkey Egg Griffin, In the Alamo, A Yankee from the West* and *Son of the Swordmaker.*

Read, Thomas Buchanan (1822-1872), an American poet and painter. He was born in Pennsylvania, and lived in Ohio, in New York, and in England. He was both a landscape and a portrait painter. He painted a portrait of Longfellow's daughters which has been much admired. Photograph copies have been circulated widely. Read published several long poems, but is known best for *Sheridan's Ride,* which is one of the most popular war ballads ever published. *Drifting, The Brickmaker,* and *The Uprising in 1776* were other well known poems.

Reade, reed, **Charles** (1814-1884), an English novelist. He was educated at Oxford, and, in London, for the law; but preferred to write novels. *Foul Play* is an intensely interesting tale of shipwreck. *Put Yourself in His Place* is a well told, sympathetic story of trades unions. In *The Woman Hater,* a plea is put forth for the right of women to vote. *Hard Cash* is an attack on private lunatic asylums. *Never Too Late to Mend,* as might be inferred from the title, deals with prison management. *Christie Johnstone* is a dialect tale of Scotch fisher-folk. *Peg Woffington* is not worth reading. *The Cloister and the Hearth,* especially the first third, is a powerful word picture of the fifteenth century. Other stories are *Griffith Gaunt, A Terrible Temptation, The Wandering Heir,* and *A Perilous Secret.* As a novelist Charles Reade belongs to the realistic school. His stories, marked by a peculiarly rugged, energetic style, represent several quite distinct types. The historical novel, the novel "with a purpose," the psychological novel, the melodramatic novel,—each is found in the list. Critics usually place Reade foremost in the second rank of English novelists. Some give him a higher place. See CLOISTER AND THE HEARTH.

Reading, the process of observing and apprehending the thought of written or printed discourse. Very commonly the word is used to indicate the vocal expression of that which is written or printed, more properly called reading aloud.

The beginning of formal education must necessarily consist in learning to read, since at every step in his later progress the pupil must make use of the power of obtaining information from the printed page. But long before the child begins his formal education he has been taking the necessary preparatory steps toward learning to read. He has become used to associating spoken words with objects or ideas, now he must learn to associate written symbols with them. The child who has seen and handled books, who has had stories and poems read to him from babyhood, is far better fitted to learn to read himself than he who has had no such preparation. He has some notion of what he is expected to learn, and he has, as it were, an appetite for learning it.

The oldest method of teaching reading is the alphabetic or synthetic method, but it has been almost entirely abandoned. So far as the individual child is concerned, the method counts for little. The person to whom learning to read was so natural a process that he remembers it no more than he remembers how he learned to talk has learned to read by an ideal method. So far as class work is concerned, the combination of the word and the sentence method has established its claim to superiority. Of far more importance than the method of teaching reading is the subject matter which the child reads. Forty years ago a series of school readers, usually six in number, furnished all the literary matter used in common schools. Occasionally some progressive teacher reads a choice selection to the children on Friday afternoon. Many of the fathers and mothers of the school children of today can remember reading the *Lamplighter,* or the *Vicar of Wakefield,* or some other exciting tale smuggled inside their geographies at school, its perusal being none the less fascinating because accompanied by a delightful sensation of having dared a great wickedness. Supplementary reading is now provided in sufficient quantity and of such quality that pupils need never weary of the reading lesson and may look forward to pleasant occupation when the lessons are learned.

If a general criticism were to be made on the teaching of reading in our public schools, it would be on the time devoted to it. In the opinion of many, much time devoted to other subjects in the grades should be spent in reading. To become a good reader two things are essential for the average child: First, to hear a great deal of good, oral reading; second, to read a good deal aloud himself. Arlo Bates says of writing that the way to learn to write is to write; so we may say of reading, the way to learn to read is to read, not once in a while, but often. Every child should read aloud daily from the time he learns the first lessons of his primer until he has graduated from high school, and after that if he can.

Reading, on the east bank of the Schuylkill River in southeastern Pennsylvania. It is located in a valley surrounded by Mount Penn, Neversink Mountain, and the Blue Mountains, and abounds in natural beauty. The Schuylkill Canal, from the coal regions, to Philadelphia, Pa., passes through Reading, and there are two important railway systems, the Reading and the Pennsylvania. The Reading Railway Company has its principal shops in this city. The largest part of the anthracite coal mined in Pennsylvania passes through this city.

Reading is a great manufacturing center, and has numerous furnaces, foundries, rolling-mills, machine shops, hardware manufactories, and other iron and steel industries. It also has many knitting, cotton, woolen, silk, and paper mills; carriage, cigar, hat, paper, shoe, and other manufactories. Its people are industrious and mostly of German descent and as a rule own their homes. They are conservative but thorough. The public schools of Reading rank among the very best. Reading has a number of philanthropic institutions, among them a free public library and a commercial museum.

Reading is located in a rich agricultural region, and living expenses are comparatively low. Its population, in 1920, exclusive of its beautiful suburbs, was 107,784.

Reading of Earley, Rufus Isaacs, First Viscount (1860-), an English lawyer and jurist who was appointed Viceroy of India in 1921. He was born in London, of Jewish parents, and studied at the University College School, London, and in Brussels and Hanover. His father was a fruit merchant, and Isaacs rose to prominence and the peerage by the force of his attainments. For a while in his youth he was a seaman on a coal ship running to South America, but later he studied law, and was called to the bar in 1898. He rose rapidly in his profession, attaining high standing in the legal world. In 1904 Isaacs was elected to the House of Commons for Reading and in 1910 was made Solicitor-General. In the autumn of the latter year he was appointed Attorney-General. In the latter capacity he won royal favor and was given a seat in the cabinet in 1912. In 1913 he was made Lord Chief Justice. Isaacs had been knighted in 1910; in 1914 he was made a baron, and a viscount in 1916. He visited the United States as head of the Anglo-French Commission in 1915, and was appointed Viceroy of India six years later.

Real Estate, in law, land and whatever goes with it. Domestic animals, vehicles, loose lumber,—in general, articles that are movable,—are not reckoned a part of real estate; but in selling a farm, fences, buildings, a pump in a well,—in short, whatever has in a way been annexed to land,—goes with it. Standing trees belong to the land. Cordwood is personal property. Seed in the ground and growing crops go with the land. Harvested crops are personal property. Unless expressly reserved, all minerals, ores, and oils belong to the buyer of the land.

In one sense of the word, there is no individual ownership of real estate. The governments of all countries retain the right of eminent domain. Whenever land is necessary for a road, railroad right-of-way, station, library building, schoolhouse, court house, or for any other public or partly public purpose, the individual owner may be required to surrender his land for the general good. In all civilized countries he is entitled, by law, to receive full compensation.

In certain parts of England and other restricted portions of the world the law of entail prevails. Real estate passes from father to oldest son or next male heir. The owner, in fact, occupies merely in trust for the next heir. He can neither give, sell, nor bequeath real estate. In most countries, however, real estate, like personal property, is divided at the death of the owner among his children, the wife coming in for a share, varying with local legislation.

The sale of real estate requires more formality than that of personal property. A transfer is not binding until it has been committed to writing. In most of the states the deed must be signed by man and wife in the presence of witnesses. Both man and wife must certify in the presence of a notary public that their signatures are given of their own free will, and not under compulsion. When a deed thus executed has been handed formally to the purchaser, the transaction is complete.

The total value of real property and improvements in the United States (continental), according to late official estimates, was approximately $112,000,000,000, thus constituting a large percentage of the national wealth, estimated by the U. S. Census Bureau at nearly $200,000,000,000, or about $1,818 for each man, woman and child in the country. The census of 1920 showed that there were 6,448,343 farms in the United States, containing 503,073,007 acres improved and a total acreage of 955,-883,715. The value of the land in farms was reported in 1920 as $54,829,563,059, and the value of farm buildings as $11,-486,439,543. The total value of all farm property, including land, buildings, implements and machinery, and live stock, was $77,924,100,000 in 1920. The most important agricultural states rank in the following order: Iowa, Illinois, Texas, Nebraska, Minnesota, Missouri, California, Kansas, Ohio, Indiana, South Dakota, Wisconsin, New York, Michigan, North Dakota, Pennsylvania, Oklahoma, Kentucky, Georgia, Tennessee, North Carolina, Virginia, Colorado and Washington. These are the states possessing one billion dollars' worth or more of farm property on January 1, 1920.

REAL ESTATE

Land, that is, real estate or realty, differs from other objects highly valued and desired by man in that the amount of it is limited. By new discoveries in agriculture, mines, chemistry and other directions, man may add vastly to the available quantity and annual supply of wheat, cotton, wool and other food and clothing stuffs, also to the world supply of gold and diamonds; but no man can possibly add to the amount of land. Man may convert swamps, desert and mountain lands into those capable of producing valuable agricultural products; he may add to the available land, in locations where real estate is especially valuable, by filling-in and building out into streams and other bodies of water; he may even reclaim tidelands. But, aside from these comparatively insignificant additions, the supply of land is strictly limited; and no matter how great may be man's demand for more of it, he has little or no power to increase the supply.

This limitation upon the general law of supply and demand, as affecting the value of a thing, produces in the case of real estate various divergencies from the rules governing most commodities and commercial transactions. Its general effect is seen in the United States by the steady rise in value of farm-lands east of the Mississippi River. Being limited in acreage, they rise in price because of that fact; but as man cannot produce more acres than there always have been and are now, a new value-making factor must be considered in connection with land values.

The operation of the law is seen plainly in such cities as New York and San Francisco, where natural obstacles practically restrict the growth of the city to its expansion in one direction only, and it is this that caused the enormous rise in real estate values on Manhattan Island. The demand increases daily, but it is absolutely impossible to increase the supply on that island; hence the values of real estate in the Borough of Manhattan, New York, have soared even higher skyward than the towering skyscrapers whose height itself testifies to the need of affording floor and office space sufficient to pay proper interest on the enormous cost of the land beneath them.

As a matter of fact the value of land is steadily rising all over the earth, broadly speaking, and under present economic systems will no doubt continue to rise. Even now in our own country the supply of natural farm lands open to settlement by persons purchasing lands belonging to the public domain, is practically exhausted; and for this reason private and government enterprises are now draining swamplands and reclaiming and irrigating lands that but a short time ago were thought to be utterly worthless as farm-lands. Emigration of many American farmers to the abundant wheat lands of northwestern Canada in recent years bears testimony to the growing scarcity of cheap land for agricultural purposes in the United States.

It is commonly believed that the economic rent is the basis of value of real estate; that is to say, that its value is determined by the rent-income it will bring in. This, however, does not account for the many anomalies visible in city and country property, in which one piece of land is worth and can be sold for much more than an adjacent piece of real estate similarly improved, although both parcels may bring in the same rent to the respective owners. No subject is more difficult of analysis and explanation than the reasons for the varying values of certain parcels of real estate, apparently similarly circumstanced and located and improved to the same degree. Utility—the location and adaptability to a desired end—is, however, the ruling factor in real estate values. The accessibility of real estate, its proximity to market, office, or residence, is a potent factor in the problem of city and country properties, other things being equal. One can see that city rent is based on the value of the social service rendered, especially the ground-rent. Yet rent and value often are dependent largely upon purely social features, matters of fashion and taste, and sometimes perplexing and even freakish preferences for one locality over all others.

Values of real estate are fixed, for taxation purposes, by local assessors and boards of tax-review appointed conformably to the charters of cities and the laws of the respective states. Such official assessments unfortunately are usually of little or no value, except perhaps as indicating the min-

imum value of any given piece of real estate. The true value of a parcel of real estate is what the property will bring in the open market, under ordinary conditions, when a reasonable time is allowed for its sale. A forced sale affords only an approximate valuation. Thus, in the valuation of a piece of land, the first thing to be learned is what it brought the last time it was sold; also it is well to search back in the public records and see what it was sold for to the present owner. Such data may or may not be found in the land records kept in the courthouse of the county in which the real estate is situated. Deeds of transfer do not always state the actual price for which property is sold; and when they do not, other means of a private nature must be resorted to in order to ascertain a former selling price.

In our largest and fastest-growing cities, real estate in the center, most sought after by business concerns, is advancing more rapidly than it is anywhere else in the world, if we except our former western desest lands that have been reclaimed and irrigated. Time alters the value of all real property. A first-class real estate city is one that has tributary to it a large and flourishing agricultural population inhabiting the surrounding country, and the larger the area of this territory the more solid is the foundation of that city's lasting prosperity and growth. It fills a distinct need in the body politic, by establishing markets, receiving raw materials, and converting them into finished products for food, clothing, housing, and modern life comforts and conveniences, and then supplying the surrounding country and other cities with them, besides acting as general distributing centers for all merchantable goods. Real estate values naturally rise in a city that performs these functions in the economic system of a great nation; while farm values rise with the increased demand for farm products.

Realism, a term used in opposition to idealism; it endeavors to prove that we have sensations independent of conscious actions. The greatest exponents of realistic philosophy include Thomas Reid, a Scotchman, who believed that certain of our actions, probably subconscious, are intuitively received; Johann Friedrich Herbart, a German philosopher; and Immanuel Kant, probably the most influential of them all, who maintained that our whole world is a product of the mind, with the element of time strongly linked to it. Kant asserted that our ideas are not an end in themselves, but they are *regulative principles* involved in our actions.

The tendency in realism shows an increasing inclination toward the radical. Realistic philosophers refuse to accept the theories of idealistic philosophers as a basis for their later conclusions.

Realism in Fiction, the delineation of life as it actually exists. Idealism depicts life as it should be. Romanticism pictures an imaginary existence, to whch the remote and the unknown lend a glamour which charms and fascinates. The writer of a romance is a painter who may use his brush to color his scenes as his fancy dictates. The realist is a photographer whose plate reveals the minutest details of the scene upon which he focuses his camera. The idealist uses the camera, but he selects only beautiful subjects; he studies to get the best possible view, and always "takes" his picture in a good light.

A new school of English and American fiction writers have carried realism to such an extreme that we now have what many people complain is an unsuitable type of novel for the rising generation to read. The exploitation of "life as it is," including whatever dregs and immoral relations that may occur, results in reading matter which is believed to have a revolting and contaminating effect. There are arguments on both sides of the issue. However, this much it is safe to say: Literature that is alive and stimulating is needed, but it should not lose the clean and wholesome influence which it has hitherto exercised.

In a romance the plot is of vital consequence; incident stands next in importance; the characters last. In realism this order is reversed. The characters are of first consequence, incident of less moment, and plot unnecessary, since the average human life is without such entanglements. The characters themselves must be the real peo-

ple of everyday life; such people as we all know, as we all are. Realism is not opposed to idealism in the truest sense. As a commonplace man or woman, such for instance, as Adam Bede, leading a humdrum life, may, by cheerfulness, unselfish fortitude, and hopeful courage, inspire those about him, so a novel, though strictly realistic, may offer a wholesome consolation for the inevitable sorrows of life and awaken higher aspirations and more worthy ambitions. This is idealized realism and is found in the highest type of novel, although undoubtedly that writer is also a realist whose stories are filled with low and sordid characters, vulgar scenes, and incidents of hopeless crime and misery.

It will be seen readily that these qualities of fiction, realism, romanticism, idealism, cannot be kept absolutely distinct. For instance, in *Robinson Crusoe* we have a tale of adventure—pure romance in subject—but in method of treatment it is realistic—the commonplace doings of a difficult and even sordid life hold our interest because they are so real, so natural. For the time being the reader himself lives the daily life of Crusoe on his desert isle, and is fascinated, not by the romance of a situation, but by the reality of that existence.

Jane Austen is a pure realist. She depicted the life she knew and trusted to no fanciful situations to awaken interest. It must be confessed, however, that *Pride and Prejudice* is a wearisome story and that the author's talent is admired rather than enjoyed. Mrs. Gaskell in *Cranford* focused her camera on the simplest of lives, but produced pictures worth looking at again and again. Tolstoi, Zola, and Ibsen are realists who selected, not beautiful and tranquil scenes, but sterner, coarser, more wretched views. They did this that these evils might be corrected, and their works are powerful and effective. The realist, however, who gives us a painful picture with no other object than to show us how well he can do his work, is false to his art and can win no enduring fame.

Among English writers, Scott, Stevenson, and Kipling may be mentioned as romanticists. Thackeray was a realist, although in depicting certain characters, notably Henry Esmond and Colonel Newcome, he lets his imagination idealize the picture. Dickens occasionally indulges in the romantic subject. He is a realist in method, and always an idealist. He throws a glamour over his men and women, but they are nevertheless intensely real to the reader as they were to the writer. George Eliot is a realist, she aims to reproduce to the life what she has seen. She does not reject a romantic situation, however, and of purpose she presents ideal characters. Thomas Hardy and Mrs. Humphry Ward are distinctively realistic writers.

Our first American story writers were romanticists. Irving mingled humor and pathos in his tales. Cooper wrote stories of adventure. Poe selected the horrible and the mysterious, while in the novels of Hawthorne we find the spiritual and the ideal. Then, after the Civil War, and perhaps because of it, romance dropped into disfavor. Public taste demanded the commonplace in fiction,—quiet stories of ordinary people, such as Mrs. Stowe's later novels, Miss Alcott's, read by young and old, J. G. Holland's, Mrs. Whitney's, Edward Eggleston's. These are all realistic, as are the dialect stories so popular a little later. Toward the latter part of the nineteenth century a reaction set in in favor of romance. Weir Mitchell, Mary Johnston, and Marion Crawford wrote popular tales. At present it may be said that the two schools are almost equally in favor. The realistic school, as such, was founded by William Dean Howells and Henry James, who are still its most noted exponents. Mary Wilkins ranks high as a writer of realism. Stockton writes romances in a realistic manner.

Critics may argue for the realistic or the romantic novel, each according to his own view. The novel writer will obey the law of his own nature. The novel reader will continue to demand both romance and realism and rejoice that he has both to read.—MARY BLANCHARD MURPHY.

Reäl-Schulen, a German name for secondary schools less classical than the gymnasia. In the reäl-schulen, as the term is used ordinarily, Latin and Greek are not taught. Modern languages are given a prominent place. Like the gymnasia, these schools lead to the university, which begins

with what an American terms the junior year. In 1908 there were 338 reäl-schulen in the German Empire.

Reaping, in agriculture, the harvesting or cutting of grain. No doubt grain was pulled by hand before an implement was invented. The earliest prehistoric grain sickle of which remains have been discovered was a curved blade of flint. Short curved flint scythes have been found also—some of them rounded at one end as if for the reception of a handle. Later, primitive sickles were made of bronze and iron. The "sickle of our grandfathers" was a curved scimiter-like blade of steel with a sharpened or else a finely serrated or notched edge. The reaper thrust his hook into the standing grain, gathered a cluster into his left hand, then cut it off with a quick sweep, laid the handful on a pile, and reached for another. A band of reapers advanced up a field like a rank of soldiers, each cutting his strip. At the harvest season the shoemaker was expected to leave his bench, the petty shopkeeper his till, to aid in harvesting. Women and children worked in the harvest field.

Parties of reapers from the cities and from the pastoral portions of Europe went into the grain-raising districts for harvest wages. The Highlanders came down from their mountains; the Irish crossed into England to cut the corn, as grain is called. Long, laborious hours were enlivened by harvest songs:

> Such have I heard in Scottish land
> Rise from the busy harvest band,
> When falls before the mountaineer
> On lowland plains, the ripened ear.
> Now one shrill voice the notes prolong,
> Now a wild chorus swells the song.

The completion of harvest was followed usually by harvest home festivities. The small fields of Central Europe are still reaped with a heavy scythe. About the time of the War of 1812, in this country at least, the scythe blade was widened to carry cut grain on its upper surface, and a frame of fingers was added to prevent the grain from falling off. This was the grain cradle. A quarter of an acre was a day's work for a sickle. The expert cradler was able to lay from two to four acres in long, even swaths.

In 1834 a patent was issued to Cyrus Hall McCormick of Virginia for the invention of a reaping machine drawn by horses. His first machine was exhibited in 1831. A Mr. Obed Hussey who took out a patent in 1833 claimed that McCormick stole his ideas, but the credit of invention is allowed McCormick. The latter began manufacturing, and in 1847 established himself at Chicago to be near the grain fields of the Northwest. The first reaper was a hand-rake. The grain fell on a platform as it was cut. A man swept it off with a rake-like fork as often as enough collected to form a gavel, as an unbound bundle was called. The next step was a self-rake. A wooden arm operated by machinery moved across the platform periodically sweeping off the gavel. Next came the dropper. The grain fell on a hinged platform of slats, which the driver controlled by a pedal. As soon as a gavel had collected on the platform the driver allowed the rear end to drop into the stubble. The gavel slipped off, the slats were tilted up again to catch a new gavel. The hand-rake and the self-rake delivered the gavel behind the running gear, leaving the freshly cut swath free for the passage of the machine. The dropper was a light running, simple machine, but it left the gavel directly behind the sickle bar. Each row of gavels must be bound and thrown aside before the dropper could cut another swath. The dropper was succeeded by the harvester. The grain fell on a continuous canvas carrier that delivered it on a table at which two men stood to bind. As the men rode and spent no time in walking from gavel to gavel, they were able to do the work of from four to six men binding on the ground. By allowing their bound bundles to accumulate before pushing them off, they were able to drop them in windrows for the accommodation of the shocker.

The reapers described appeared in rapid succession. As harvest wages ranged from $2.50 per day and upward, farmers seized upon each labor-saving machine, discarding half worn reapers in favor of the newest invention. About 1875 the successful self-binder appeared. This machine replaces the two men of the harvester by an automatic binder. As often as a gavel collects, an iron harpoon, carrying a strand of twine after the fashion of a sewing machine

needle, descends, binds the bundle, knots the twine, and shoves the bundle into a carrier. The driver again, by means of a pedal, dumps the bundles in windrows for the shocker. This self-binder has been improved, but it is still the prevailing type of machine in the great wheat fields of the world.

In 1919 an improved reaping machine was introduced in the United States and after successful tests was placed on a quantity production basis for the market. This machine cuts a swath 14 feet in width, and is capable of harvesting the heaviest crops of grain. It received its initial tests in the state of Texas, where it successfully cut and bound a crop of oats standing over five feet high and running more than 100 bushels to the acre. This machine is electric-lighted and can be operated by night as well as by day. It is equipped with roller bearings and other devices to insure smooth running and ease of operation by one man. Its capacity is more than double that of the average self-binder and its advent marked a decided step forward in the progress of reaping.

Reason. See THINKING.

Reaumur, rā-ō-mŭr′ (1683-1757), a French scientist. He was educated at the Paris in 1703. His scientific acquirements attracted the attention of the learned men of Paris. Five years later he was chosen a member of the Academy of Sciences, of which he continued an active member for half a century. He studied the formation of pearls. He was a learned student of fossils. He proved to the Academy that a peculiar gem, known as the Languedoc turquoise, was the tooth of an extinct animal. He brought an improved method of making steel to the notice of the manufacturers of France. See THERMOMETER.

Rebate. See INTERSTATE COMMERCE.

Rebecca, in Scott's *Ivanhoe,* a young Jewess, the daughter of Isaac of York. Generous, courageous, highminded, she withstands all temptations that wealth and pride of place can offer her, remains loyal to her religion although it is despised by those she loves, faces an awful death at the stake with calm dignity, and, in repelling the suit of the villain, Brian de Bois-Guilbert, chooses death rather than dishonor. She is one of Scott's greatest creations and one of the noblest characters in all fiction.

Rebus, a word, name, sentiment or pithy saying set forth in pictures or various devices, such as the position of words, syllables, letters, etc., with reference to some other part of the rebus. Like the charade, the rebus serves for parlor amusement. A few may be given by way of illustration:

:A

An American author and one of his chief works.

The answer is: Mark Twain, Innocents Abroad (in no sense, A broad).

In the same way Wyandotte, a town in Kansas, is represented by

Y.

The following, based entirely on the position of syllables, purports to be a post-office address:

hill
John
Mass.

The postal authorities are supposed to interpret: John Underhill, Andover, Massachusetts.

A variety of rebuses may be expressed in a simple way by a picture or two, as:

A noted discoverer—A column and an omnibus.

A state of the American union—Noah's ark and a handsaw.

A city of Massachusetts—A sail bearing the letter M.

The Keystone state—A lead pencil, a weather vane and A.

Recall, a method of getting rid of obnoxious officials before the term of office expires. The usual machinery to be set in motion is a formal mandate signed by a majority of the legal voters, suspending the official in question from office. If an appointive office his removal is final. If an elective office, the deposed official may appeal to the voters at an immediate election. In some cases a smaller proportion of the voters, as thirty or twenty-five or ten per cent, is authorized to recall. The recall is in force in the cities of the Pacific Coast. An objectionable alderman was recalled in

Los Angeles in 1905. The mayor of San Francisco was removed in 1908. In 1909 Boston adopted a charter providing for the election of a mayor to serve four years and authorizing his recall at the end of two years. The recall has been adopted very generally by the states and municipalities that have the initiative and referendum. It is an effective weapon for deterring officials from defying the will of the people. Even the most corrupt and subservient office-holder is reluctant to arouse a storm that may sweep him from office. See INITIATIVE AND REFERENDUM.

Récamier, rā′kȧ′myā′, **Jeanne Francoise Julie Adelaide Bernard** (1777-1849), a French society woman. She was born at Lyons, was educated at the convent of La Deserte, and was married to Jacques Récamier, a Paris banker more than double her age, in 1793. Her salon became the meeting place of all the brilliant French men and women of letters and politics, and her social triumph in Paris was unparalleled. Chateaubriand, Ballanche, and Madame de Staël were frequent guests, and through many of these literary and political celebrities Madame Récamier exerted her influence on French literature and government. She opposed the policies of Napoleon and as a result of this Napoleon refused to lend assistance when the Récamier bank failed in 1806. After the financial crisis she spent a few years with her friend Madame de Staël, away from Paris, but returned on the downfall of Napoleon and the brilliant circle of friends and admirers again assembled at her home. She died of cholera, in Paris. Her one work, *Recollections and Correspondence,* was published in 1859.

Reciprocity, an international form of protection policy under which two or more tariff schedules can exist at the same time. By agreement two countries can adopt a set of low tariffs applicable to each other and retain a higher one for other countries. The purpose of such an agreement is to stimulate trade, and where the policy has been tried out it has not been ineffective. From 1870, over twenty-seven agreements have been made among European states. In the United States the policy was adopted with Canada through the treaty of 1854 and terminated in 1865. The reciprocity treaty controlled the navigation of the St. Lawrence River, the fisheries, and the products of the two countries were mutually interchanged by free trade. General dissatisfaction arose in the United States within the next three years due to various causes, and the treaty was discontinued.

In 1857 another experiment was made in the treaty between the United States and Hawaii. Danger of too great control of the Pacific and too liberal trade with the islands by Great Britain precipitated the signing of the treaty which was to be concluded after seven years. Sugar, rice, and other tropical products were admitted free of duty. Hawaii reciprocated by receiving machinery, various manufactures, agricultural and meat products. The treaty worked for the benefit of Hawaii, due to the way it opened for larger exportation of sugar. The United States averaged a loss of duties of from two to twelve million dollars annually. In 1887 the treaty was again ratified, but further discontent was averted in 1898 by the annexation of the islands.

The most important aspect which the question has assumed during the past decade is the renewed agitation for reciprocal trade relations between the United States and Canada. The movement was favored by this country in 1902-3, when a shortage of coal, ore, and cheap lumber was felt in the North. Throughout the United States it has grown to be a recognized fact that the population is increasing more rapidly than the necessary proportional increase in agricultural products, and this points to the fact that our attention will be turned more and more away from agricultural and directed to manufacturing exports. Hence the influence of the general support of reciprocity has been strongly felt. The Payne-Aldrich Law provided that President Taft should decide by April, 1910, the countries to whom the maximum and minimum tariff rate should be extended. He exerted himself to secure a decision from Canada and after several conferences Canada accepted an arrangement which granted our country thirteen schedules of intermediate tariff. Among the forty stipulated articles were oil, drugs, cottonseed, leather, china, soap, perfumery, etc. Throughout the year the

president made further efforts to obtain greater freedom of trade. In September, Mr. James Bryce, the British Ambassador, consented to negotiations between Canada and the United States, and in October Sir Wilfred Laurier, Premier of Canada, stated publicly that he favored reciprocity because he thought that arrangements could be effected which would mutually benefit the two countries. In November a conference was arranged in Canada, but it adjourned to meet in Washington in January, 1911. On January 26, 1911, an agreement was formally reached between the American and Canadian negotiators that they should advocate reciprocity between the two countries, and on the following day President Taft sent a special message to Congress urging the passage of the bill; but when Congress adjourned on February 14, the bill had passed the House but was still an open question of debate in the Senate. A new session was called, and it was not until July 26, 1911, that President Taft was enabled to sign the agreement. The success of Mr. Taft's efforts was recognized throughout the country as a personal triumph. The Canadian Parliament dissolved July 29, before any action was taken, and the question was submitted to the people, constituting the main issue between the Liberals who favored a reciprocity and the Conservatives who opposed it. The Conservatives won a substantial victory, and reciprocity was defeated.

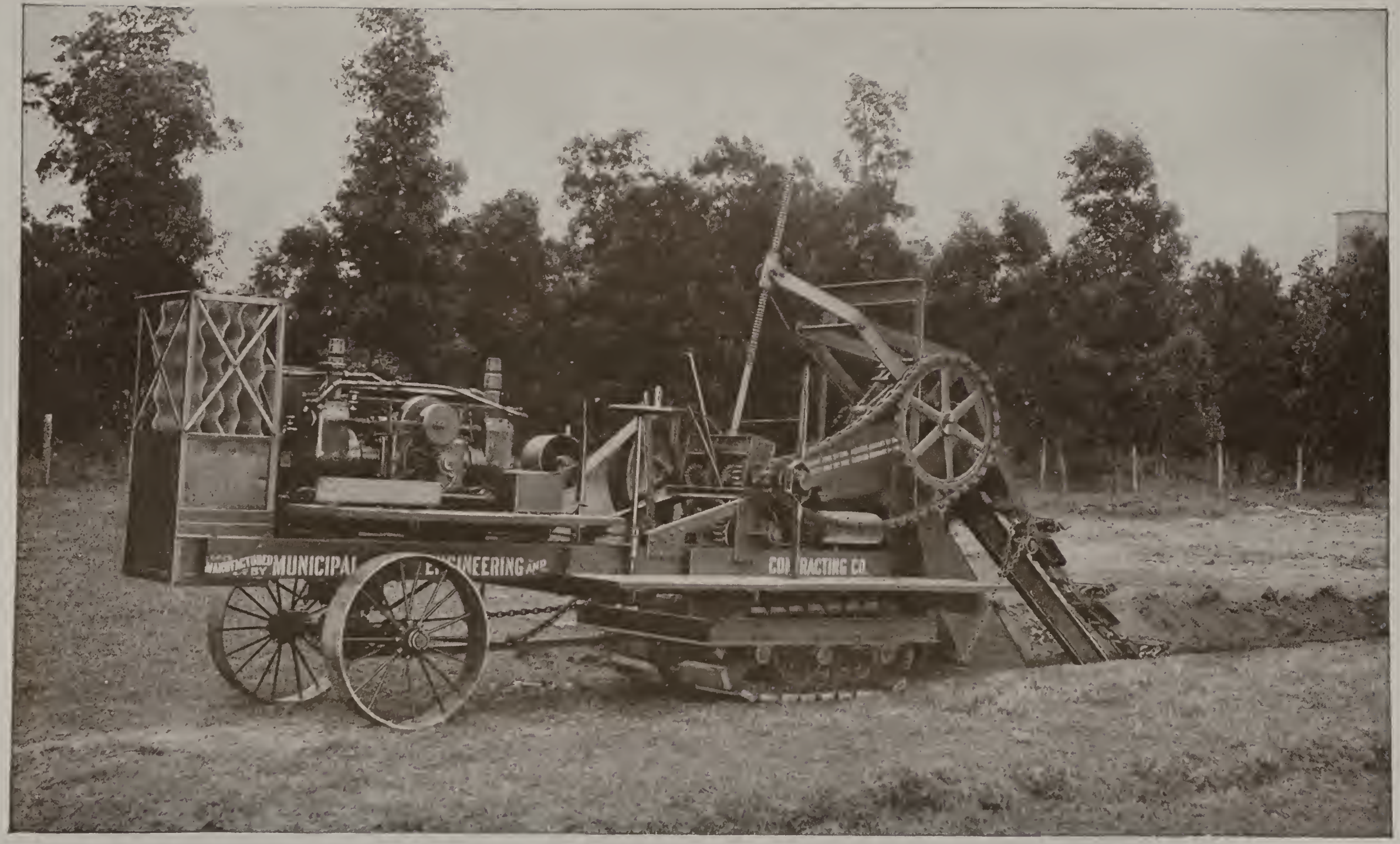
Reclamation Act, an act approved by Congress June 17, 1902, by which a fund is set aside for the reclamation of arid lands. The money is obtained from the sale of public lands in the West, five per cent of the proceeds of these sales being deducted and used according to law for educational and other stipulated purposes. On June 25, 1910, Congress increased this sum, which had been found insufficient, by authorizing certificates of indebtedness not to exceed $20,000,000. Five years were granted for the payment of the debt out of the reclamation funds. The decision of how the money should be expended was entrusted to the Board of the Engineering Officers of the United States Army. On June 30, 1910, the sum received through sale of public lands amounted to $65,700,000, and the money expended was $53,781,302.

Since the year of its establishment the Reclamation Service has done extensive work in various lines. In 1922 six of the largest dams in the world, the Roosevelt dam in Arizona, the Pathfinder in Wyoming, the Arrowrock in Idaho and the Elephant Butte in New Mexico had been completed. The service has constructed 13,600 miles of canals, ditches and drains, to complete which involved the excavation of 200,000,000 cubic yards of earth and rock. By 1922 100 storage and diversion dams had been constructed and 101 tunnels, 1,000 miles of road, 83 miles of railroad, 3,280 miles of telephone line, 12 power plants and 840 miles of transmission lines were completed. The service mines coal and manufactures cement.

The present annual expenditure of the service is about $10,000,000 and the service employes number from three to five thousand. It operates in seventeen arid and semi-arid states and in 1922 had in hand twenty-five primary projects comprising 2,825,000 acres and three Indian projects comprising 384,000 acres. Water from government reservoirs is served, by way of private canals, to an additional 1,100,000 acres. Water was supplied by government canal to 1,227,500 acres in 1921, and in that year 1,158,900 acres of this land were harvested.

Reconstruction, the political re-organization of the southern states at the close of the Civil War. Three views were held in regard to the status of these states and their relation to the Union. One was the view of President Lincoln, who maintained that secession was an act of rebellion on the part of individuals and that the state governments had not been affected. President Johnson, too, adopted the view that the position of these states in their relation to the Union could be restored upon renewal of their obligations to the Constitution. The extreme other view was supported by men like Sumner and Stevens, who advocated the theory that the South was a conquered territory and that it should be held subservient to Congress. The third view, with the second, made the problem a legislative one, but was less radical. This was the attitude of Congress which maintained

IRRIGATION BY PRESSURE SYSTEM—Idaho
IRRIGATION BY FURROW SYSTEM



DITCHING MACHINE

that the southern states had "deprived themselves of all civil government." At the meeting of Congress in December, 1866, President Johnson stated that the southern states (except Texas) had accepted the thirteenth amendment, had framed new state constitutions, and had declared themselves ready to comply with any executive requirements. Congress ignored these provisional arrangements, and the Congressional reconstruction act was passed in March, 1867, over the veto of the president. One of the chief conditions for re-admission was the ratification of the fourteenth amendment, and, by July, 1868, seven states had been admitted to the Union under the provisions. Within the two years which followed the other states were gradually restored to full position in the Union. Georgia was the last to comply with the provisions. In 1877 the troops were withdrawn from the cities in the south and federal interference ceased with the end of the reconstruction period.

Record Office, The New, an office building in London for the custody of state papers. It is a fireproof structure in the Tudor style. It is situated in Fetter Lane near Chancery Lane, in the very thick of London, three miles from the Houses of Parliament. There are 228 rooms arranged like the cells of a penitentiary. Each compartment is 24 feet long and eleven feet wide. The rows of rooms are separated by passages paved with brick. The entire building is fireproof; the floors, frames, and ceilings are of iron. The doors are of slate. Public records of value were gathered here from the Tower and from the Chapter House of Westminster Abbey and elsewhere in 1866. Among the priceless documents are William the Conqueror's Doomsday Book, in two parchment volumes, the resignation of the Scottish throne by David Bruce, a treaty of peace between Henry VIII and Francis I, numerous deeds of monasteries in England and Wales exacted by Henry VIII, as well as charters, first copies of laws, and many other state papers. Although the building is open to the public from ten to four o'clock, it is visited rarely except by those who have business or who are interested in historical documents. Scholars may inspect the papers without fee. Authorized clerks will furnish fair copies at eighteen cents per page of seventy-two words.

Rector. See EPISCOPAL CHURCH.

Red Cross, a general term applied to societies engaged in assisting the wounded in time of war. In accordance with an international treaty made at Geneva in 1863, all persons connected with the work of caring for the wounded on the field of battle, in hospital service, and hospital ships are treated as neutrals, and are to be exempt from being fired upon or molested by either army, no matter which side they may belong to. The members of the Red Cross Society are held in honor bound not to assist the military operations of either army. Red Cross societies have been organized in all civilized countries. That of the United States has been incorporated under the name of National Red Cross, with Miss Clara Barton as its leader. The movement proved its efficiency first in the war of 1866 between Germany and Austria, and again in the Franco-Prussian War in 1870. The Red Cross service has been able to do something to lessen the horrors of the atrocious warfare that has been carried on between Turkey and its southern neighbors, and did its part during the Spanish-American War. The mikado of Japan is a firm friend of the organization, and has befriended its operations, not only in the war between Japan and China, but in the late war with Russia. The American Red Cross has more than 28,500,000 adult and junior members. In France alone, during 1918 it spent more than $36,500,000. See NIGHTINGALE; AMBULANCE; SURGERY; BARTON.

On May 10, 1917, President Wilson appointed a war council of the American Red Cross to carry on its work during the war with the central powers of Europe, and this council continued to function until the end of February, 1919. During the 21 months that intervened the American people gave in cash and supplies to the American Red Cross more than $400,000,000. No value can be placed upon the contributions of service which were given without stint and often at great sacrifice by millions of Americans.

The effort of the American Red Cross in the world war constituted by far the largest

voluntary gifts of money, supplies, and service ever contributed purely for the relief of human suffering. Through the Red Cross the heart and spirit of the whole American people were mobilized to take care of our own sick and wounded, to relieve the misery incident to the war, and also to reveal to the world the supreme ideals of our national life. Fully 8,000,000 American women exerted themselves in Red Cross service.

When the United States entered the war, the American Red Cross had about 500,000 members. In February, 1919, there were upward of 17,000,000 full-paid American members, outside of the junior Red Cross, numbering about 9,000,000 school children additional.

The chief effort of the Red Cross during the war was to care for our men in service and to aid the army and navy wherever the Red Cross might be called on to assist. As to this phase of the work, Surgeon-General Ireland of the United States Army said: "The Red Cross has been an enterprise as vast as the army itself. From the beginning it has done those things which the army medical corps wanted done, but could not do itself."

In France the work of the Red Cross was upon an exceptionally large scale. Service was rendered to the French army as well as to the American, and to the French people at large as well; the latter particularly during the trying period when the allied world was waiting for the American army to arise in force and power. Hospital service for our army in France greatly diminished with the signing of the armistice in November, 1918, but the Red Cross continued to be called upon for service on a large scale in the great base hospitals, where thousands of American sick and wounded were still receiving attention. Our army of occupation in Germany, until 1922, was accompanied by Red Cross medical units, prepared to render the same emergency aid and supply service which was the primary business of the Red Cross during hostilities.

The American Red Cross work in France was initiated by a commission of 18 men who landed on French shores June 13, 1917. After that time some 9,000 persons were carried on the Red Cross payrolls in France, of whom 7,000 were actively engaged when the armistice was signed. The services of 6,000 persons were required for several months afterward. Active operations were also continued in Archangel and Siberia, and Red Cross workers did much to alleviate the distress of the peoples of the various Balkan countries, and Poland and Palestine after the war.

As one result of the war experiences the five great Red Cross societies of the world, including those of the United States and Great Britain, set in motion plans to develop a program of extended activities in the interest of humanity.

"The conception involves not only efforts to relieve human suffering, but to prevent it; not alone a movement by the people of an individual nation, but an attempt to arouse all people to a sense of their responsibility for the welfare of their fellow-beings throughout the world. It is a program both ideal and practical; ideal in that its supreme aim is nothing less than veritable 'Peace on earth, good will to men,' and practical in that it seeks to take means and measures which are actually available, and make them effective in meeting without delay the crisis which is daily recurrent in the lives of all peoples."

For accomplishing its mission in the years of peace which must lie ahead of us, the Red Cross will require the ablest possible leadership, and must enjoy the continued support, sympathy, and participation in its work of the entire American people. The unstinted fashion in which all our people gave of themselves throughout the war is the best assurance that our Red Cross will continue to receive that cooperation which will make its work a source of pride and inspiration to every American.

Red Deer, Alberta, an industrial city and a division point on a Canadian Pacific branch railroad, is 90 miles north of Calgary and 98 miles south of Edmonton, on Red Deer River. Besides the Canadian Pacific it is served by the Alberta Central and the Canadian Northern railroads. The city is commercial headquarters for a very rich mixed farming region and has an extensive trade in hogs, butter, cattle and milk. There are factories for the manufacture of bricks, creamery products and lumber, and near the city are found building stone, fire clay, cement rock and coal.

Red Deer is a prosperous modern city, governed by a board of commissioners.

There are four attractive parks, good graded schools and a high school, an armory, a museum of natural history, a library, a Roman Catholic convent, a municipal hospital and five churches. In 1921 the population was 2,328.

Red Jacket (1751-1830), an American Indian. He was the chief of the Senecas and lived on the shores of Seneca Lake, New York. He was fond of wearing a scarlet coat which had been given him by a British officer; hence his English name of Red Jacket. He fought on the side of the British during the Revolutionary War. In 1792 he concluded a treaty of peace with General Washington. The latter gave him a silver medal, of which he was very proud and which he wore until the time of his death. He refused to join the conspiracy of Tecumseh. In fact, he gave the American authorities notice of the intended outbreak. During the War of 1812 he sided with the Americans. He was a swift runner and a trusty scout. So far as civilization was concerned he was utterly unprogressive. He made every effort to exclude missionaries, schools, and white men's methods of farming. During the latter part of his life he became exceedingly intemperate. He was in his day a famous chieftain and an orator of no mean ability.

Redmond, John Edward (1851-1918), a noted Irish advocate of home rule, was born at Waterford and received his education at Trinity College, Dublin. In 1881 he was elected to the House of Commons for New Ross; he served this constituency until 1885, when he was returned for North Wexford, serving until 1891. He was called to the bar in 1886, but never practiced. Mr. Redmond was an eloquent speaker, his grasp of parliamentary procedure was particularly firm, and he was a power in the House of Commons. After becoming a vigorous advocate of home rule, he stood with the minority after the Nationalist split over the Parnell affair; but in 1900 he stood forth as the leader of the movement for union and was the successor of Dillon at the head of the reorganized Irish party. Mr. Redmond visited the United States in the interest of home rule in 1905 and 1910. He was aggressive and able in the leadership of his party, and after the Liberal victory of 1906 the home rule agitation was energetically renewed; nor was it slackened until the passage of the Home Rule Bill in 1914. Mr. Redmond declined a position in Asquith's coalition cabinet in 1915. He died of heart failure, in London, March 6, 1918.

Red Pepper. See CAYENNE PEPPER.

Red River, the southernmost of the great tributaries of the Mississippi. It rises in northern Texas, flows eastward between Indian Territory and Texas, cuts across the southwestern corner of Arkansas, and flows southeastward through Louisiana into the Mississippi. In its passage through the so-called Staked Plains of Texas, the Red River flows through a magnificent canyon 100 miles in length and from 200 to 1,000 feet in depth. In the central part of its course the river has been obstructed by floating rafts of dead timber and debris, the accumulations of centuries. One of these was over 100 miles in length. Every season of high water brought down more old logs and trees, until the raft spread out for seventy miles in width across a swampy expanse of the river. These obstructions were cleared away at great expense during the seventies. Near its mouth it has a tendency to flow directly southward through a bayou, known as the Atchafalaya, into the Gulf. The state of Louisiana has been at great expense building levees to protect bottom lands from overflow. During high water boats of considerable size ascend as far as Shreveport. Small, shallow craft reach the frontiers of Texas. Although 2,000 miles in length, the river is too wide, shallow, and shifting to be a valuable waterway. In the wooded regions particularly, it widens out into a broad, sluggish swamp with no decisive channel. The flood valley is marvelously fertile, being alluvial in character and of great depth.

Red River of the North. See LAKE AGASSIZ.

Red River Rebellion, an uprising of the half-breeds (métis) in the Red River Valley in 1870, led by Louis Riel (see RIEL, LOUIS); the purpose of the rebels was to overawe the Canadian government, and gain title to the land they held. The

trouble had its source in the transfer in 1869 of the Hudson's Bay Company's territorial rights in Ruperts Land to the British government, which in the following year transferred the land to the Canadian government. The valley of Red River was at this time occupied by almost 12,000 settlers, at least 10,000 of whom were half-breeds. They cultivated strips of land to which they had no legal title and which they left and re-took at pleasure. After procuring this land the Canadian government set about to organize it into sections and townships, and the appearance of the surveyors and road and bridge builders was the signal for an outbreak.

The leader of the malcontents—whose one fear was that their rights would not be safeguarded under the new government—was Louis Riel. Upon receipt of the news that William McDougall was on his way to the valley to organize a new government, Riel organized the half breeds, seized Fort Garry (now Winnipeg), and set up a provisional government for the purpose of resisting the Dominion government. At the Rupert's Land frontier McDougall was halted; he saw that his opponents were determined and also that they had a real grievance, and for the time he did not oppose them.

Riel had captured and imprisoned a handful of opponents of his provisional government, and for no discoverable cause he condemned one of them, a man named Thomas Scott, to death. The shooting of Scott infuriated the whole of eastern Canada; a force of 700 regulars and volunteers was raised, and under the command of Colonel Garnet Wolseley started westward. Riel lost heart in his enterprise and fled to the United States and the rebellion ended.

Manitoba was admitted to the Dominion while Wolseley and his men were on the march, and a tract of land 1,400,000 acres in extent was set aside for the use of the half-breeds. Few of them, however, were content, and they drifted westward, later causing more trouble. See SASKATCHEWAN REBELLION.

Red Sea, a branch of the Indian Ocean, known also as the Arabian Gulf. It lies between Arabia on the east and Abyssinia and Egypt on the west. Its extreme length from the entrance of the Suez Canal to the Strait of Bab-el-Mandeb is about 1,450 miles. Its general width is less than 200 miles. The narrowest part of the strait mentioned is less than fifteen miles. A branch about 100 miles in length extends northeastward into Arabia. The waters contain reddish marine algae, whence the name. The Red Sea occupies a long trough or valley. The shores are low and sandy, sometimes swampy. Travelers by steamer catch sight occasionally of a skulking lion. Considerable areas of sea are quite shallow. It is said that during the prevalence of heavy winds from a certain quarter, it may be possible to ford an arm of the sea. The Israelites are reputed to have crossed dry-shod from Egypt to the southern point of the peninsula which lies between the so-called Gulf of Suez and the Arabian branch of the Red Sea. The climate of the Red Sea region is excessively hot and rainless. It is estimated that the annual evaporation from the surface of the sea ranges from eight to twenty-three feet a year, according to locality. A large part of the moisture is carried by northwestern winds to the Abyssinian mountains, where it is deposited in the form of a perpetual snowcap. If the straits of Bab-el-Mandeb were closed, the sea would be converted into a bed of salt in from 1,000 to 2,000 years. See SUEZ CANAL.

Redstart, a small bird of the warbler family. The male has a shining black head, neck, breast, and back. The ends of the tail and of the wings are black. The belly is white. The rest of the plumage is of a red salmon color, and determines the general color of the bird, giving it a flashing red appearance. The name is English, meaning redtail. No other bird in our woods feeds in so many ways. One moment it takes an insect on the wing like a flycatcher, the next it is scratching up old leaves like a quail, and in a trice it is examining a twig or bit of bark like a creeper. This restless, noticeable bird glues a nest together with saliva in the crotch of a sapling, five to twenty feet above the ground.

Red Wing, Minn., a manufacturing city and the county seat of Goodhue County, is on the Mississippi River, and on the Chi-

Ulrich Zwingli.

Martin Luther.

John Wyclif.

Philip Melanchthon.

John Huss.

John Calvin.

GREAT REFORMERS.

cago Great Western and the Chicago, Milwaukee & St. Paul railroads, 40 miles southeast of St. Paul. It is situated in a rich agricultural region, and is an important market for wheat. The chief manufactures are linseed oil and oil meal, pottery and sewer pipe, stoneware, furniture, launches, engines, shoes, flour, wagons, lime and bricks. Among the educational institutions are the Red Wing Seminary, a high school, four grade schools, a public library and the State Training School for Delinquent Boys. The city was settled in 1845, and was named for the Indian chief, Red Wing. In 1920 the population was 8,637.

Redwood. See SEQUOIA.

Reed, Thomas Brackett (1839-1902), an American congressman. He was born at Portland, Maine. He was graduated from Bowdoin in 1860, a prize winner in English composition. During the early years of the Civil War he opened a law office in California, but later served as a paymaster in the Army of the Tennessee. At the close of the war he located in his native city, and soon entered state politics. After serving various terms in the state legislature he was sent to Congress, in which body he represented his district from 1876 to 1899. He was a ready debater, a cool, determined partisan. He became the acknowledged leader of the Republicans, and in 1889 he was chosen speaker of the House. In order to prevent the delay of business by filibustering tactics on the part of the opposition, and also to discipline and punish members of his own party who showed independence, he secured a quorum by counting all members present who were in sight, whether they chose to answer roll call or not. Another arbitrary rule required a member desiring to speak or to offer a resolution to obtain previous consent. In this way a member obnoxious to the presiding officer was effectually suppressed. The chief argument advanced in favor of such a procedure is that the lower house is now so large that discipline is requisite in order to transact business. In 1896 Reed was defeated by McKinley for the presidential nomination. He retired from Congress soon after and engaged in the practice of law in New York City. He is best known to librarians as the compiler of a series of volumes of modern oratory; to school boys he is the compiler of Reed's *Rules of Parliamentary Procedure.*

Referendum. See RECALL; INITIATIVE AND REFERENDUM.

Reformation, The, in history a name given to a movement of the sixteenth century that resulted in the separation from the Catholic Church of the bodies of believers known as Protestants. The Reformation may be studied from various points of view. Theologically, it was a revolt against the authority of the pope and the church, a movement in favor of the Bible as the supreme rule of faith. It is a central doctrine of the Protestant churches that a believer requires no intermediary, that is to say, priest or clergyman, between himself and his Maker. Politically, the Reformation may be regarded as a revolt of various Germanic nationalities against Italian influence. Unquestionably, too, the fact that the Church of Rome had a monopoly of religious teaching led to carelessness in certain respects that had a tendency to alienate adherents. Then, too, financial reasons were not wanting. There were those who begrudged the contributions sent to Rome, and others who desired the rich houses and lands held by the church, particularly the monasteries.

Refraction. See LIGHT.

Refrigerator. See COLD STORAGE.

Refrigerator Cars, the term applied to railroad cars used for the transportation of perishable foodstuffs, meats, game, poultry, dairy products, green fruits and vegetables and fresh fish. The number of refrigerator cars owned by the railroads of the United States in 1921 was 62,614, an increase of 44,392 since 1902. The increase in the aggregate carrying capacity during the same period was 301.5 per cent, the average size and capacity of refrigerator cars having been largely increased in recent years. Such cars are of special construction to protect the lading against the effects of seasonal temperatures, are furnished with ice chambers, and provision is made for icing them en route when necessary.

In addition to the refrigerator cars owned and operated by the railroads, there

are 56,124 refrigerator cars owned by private corporations, largely by industries interested in the movement of particular products. Most of these cars are of modern construction and suitable for the transportation of perishables in any of the railroad freight trains, the same standard of construction and maintenance being followed as in the case of railroad-owned equipment.

The several private corporations in the meat-packing industry own a considerable number of refrigerator cars. The supply of such cars is designed to meet the necessities of this particular industry, and it is assumed that the owners will augment their supply from time to time as necessity arises. These private car lines, however, do not supply all the car equipment needed for meat and its products. The railroads supply a portion of such equipment, especially to the smaller packing establishments.

Included in the list of private car lines are three companies engaged in the transportation of highly perishable commodities, such as fruits and vegetables. These are the American Refrigerator Transit Co., controlled by several railroads of the Southwest; the Pacific Fruit Express Co., owned by the Union Pacific and Southern Pacific systems; and the Fruit Growers' Express, owned by seven or eight of the eastern railroads, such as the Atlantic Coast Line, Seaboard Air Line, Louisville & Nashville, Southern Railway system, Baltimore & Ohio, Pennsylvania Railroad system, and others.

These three private car lines serve territories entirely distinct, except that the Pacific Fruit Express competes with the Santa Fe Railroad for traffic originating in California. The Fruit Growers' Express, under its present management, was organized in 1920 and took over the Fruit Growers' Express cars, formerly controlled by Armour & Co., of Chicago. This private line serves the southeastern states and usually contracts to some extent to supply cars in the state of Michigan. The American Refrigeraor Transit Co. supplies cars along the lines of its owners in Missouri, Arkansas, Oklahoma, and Texas, and along the lines of the Denver & Rio Grande Western in Colorado and other western states. The Pacific Fruit Express serves shippers on its own lines.

A large measure of success has attended the handling of refrigerator cars by these private-line companies, and it is generally believed that the extension of their activities would prove beneficial to the shipping public and to the carriers as well. With the rapid increase in the production of perishables, such as fruits and vegetables, and the nation-wide distribution now made of such commodities, it is difficult for the individual railroad lines to purchase and own the large number of refrgerator cars required to serve the particular producing districts for which they are responsible, without a great outlay of money for equipment which can be used only during a portion of the year. The carriers, however, are responsible and must supply sufficient refrigerator cars to meet fully the demands in the territory which they serve. Not only must the present needs be met, but adequate provision must be made to protect all future requirements for transportation. The solution of this problem, it is believed, is the extension of the ownership and control of the private-line companies, so that the total number of refrigerator cars may be made available for all districts of the country as the need arises. The total number of refrigerator cars now in service, railroad-owned and privately owned, is approximately 120,000, and there was a serious shortage of such cars in the fall of 1922 to handle the western fruit crops.

The railroads pay mileage rates to the owners of private-line refrigerator cars, for all movements, loaded and empty, the rate being 2 cents a mile. Approximately 50 per cent of all mileage made by this class of equipment is empty, and hence represents a transportation expense for which the railroad is not compensated. Large orders for refrigerator cars were placed by the railroads in 1923.

Regatta, an Italian word, used originally at Venice to denote a gondola race. It is now in general use and is applied to the rowing matches at Oxford, Cambridge, and American universities, as well as to yacht races. Any showy boat race may be called a regatta. See YACHT.

Regina, the capital of Saskatchewan, is an important distributing and commercial city and railroad center. It is on the Canadian Pacific and Canadian National railroads, 355 miles west of Winnipeg and about 100 miles from the international boundary.

The city is on Wascana Lake, and is well laid out with many miles of broad, paved streets. About 275 acres have been set aside as parks. Wascana and Alexandra parks being particularly attractive. The most conspicuous buildings are in the parliament group. The central structure is in the center of a 160-acre tract of land near the lake. Other features are the Winter Fair building, and King's, Kitchener, Wascana, Alexandra and other hotels.

The public graded and high schools of Regina are in every detail modern. Other institutions that serve to make this an important educational center are a provincial normal school, a collegiate institute, four separate schools, Anglican Ladies' College, Regina College, Campion College, and St. Chad's College. The library facilities are adequate.

Regina is the commercial headquarters of a fertile agricultural and stock raising region, and more agricultural machinery is distributed from this city than from any other place in Canada. There are a number of industrial establishments, producing cement blocks, sash and doors, machine shop and foundry products, mattresses, leather, flour, petroleum products and dressed meats. There is a large stockyard and several grain elevators.

Regina was founded in 1882 by the Canadian Pacific Railroad and the Dominion government; it was incorporated as a city in 1903. In 1901 the population was 2,249; in 1921 it was 34,432.

Regulus, a celebrated Roman general. He died about 250 B. C. He commanded the Roman forces in the First Punic War. In 256 he defeated the Carthaginian fleet, invaded Africa, and besieged Carthage. In the following year his army was defeated by the Carthaginians and he was taken prisoner. According to tradition, resting entirely on Roman authority, he was released on parole and sent to Rome to treat for peace, with the understanding that, if he induced his countrymen to accept liberty, he should be released; if not, he should return to Carthage. Instead of persuading the Roman Senate to accept the terms of the Carthaginians, he is said to have encouraged them to prosecute the war. On going back to Carthage he was put to death barbarously. His fate was avenged by his family, who inflicted similar tortures on two noble Carthaginians in their power. It has been suggested that the Carthaginians met their fate as described, and that the story of Regulus was invented by his family to justify Roman cruelty to Carthaginian prisoners. See PUNIC WAR; SCIPIO; CARTHAGE.

Reichsrath. See CONGRESS.

Reichstag. See GERMANY.

Reid, Whitelaw (1837 - 1912), a very distinguished American journalist and diplomat, was born at Xenia, Ohio. He was graduated from Miami University in 1856, and engaged at once in journalism, taking also an active interest in local politics. For three years he edited the Xenia *News.* During the Civil War, Mr. Reid was correspondent of the Cincinnati *Gazette,* and from 1863 to 1866 was librarian of the House of Representatives. He was appointed chief editorial writer of the New York *Tribune* in 1868, and four years later became its editor and principal owner. In 1873 the *Tribune* erected a skyscraper in New York, and after this date Mr. Reid was a leader of the tall building movement in New York. After twice refusing the position of Minister to Germany, in 1889 he accepted that of Minister to France. In 1897 Mr. Reid went as a special United States Ambassador to Queen Victoria's Diamond Jubilee, and acted in the same capacity at the coronation of King Edward VII in 1902. In 1898 he was a member of the Peace Commission at Paris. President Roosevelt appointed him United States Ambassador to Great Britain in 1905. Mr. Reid lavished his wealth upon entertainments at the American embassy and became one of the most popular figures in the brilliant social life of the British capital. He also won signal honors as a diplomat and as an orator. England honored him

with a state funeral at Westminster Abbey, and a British gunboat brought his body to America. He received a number of honorary degrees from American and English colleges, because of his excellent command of the English language. Mr. Reid is the author of *The Scholar in Politics, The Monroe Doctrine, Ohio in the War, American and English Studies,* and other works.

Reign of Terror, The, in French history, a period of the French Revolution. It may be said to have begun in January, 1793, when the king, Louis XVI, was executed, and to have ended in July of the following year with the execution of Robespierre and his assistants. The Reign was inaugurated in a period of extremity. The Convention was beset by the nations of continental Europe; the nobility in exile was plotting with the members of the nobility yet at home to overthrow the Revolutionary authorities. The republic was endangered by treason, anarchy, and invasion. Cities were incited to revolt. In what may well be termed desperation, the Convention named a Committee of Public Safety—this in April, 1793—and gave it practically unlimited power. "We must," said one of the leaders, "establish the despotism of liberty in order to crush the despotism of kings." The committee took strong measures. Deputies with despotic power were sent to the several departments to bring France into order. Revolts were put down; submission, as at Nantes and Lyons, was followed by military executions, virtually massacres. In Paris a revolutionary tribunal filled the jails with "suspects." The unfortunate queen, Marie Antoinette, was carted to the guillotine that she might not be a rallying center, and Royalists by the score were executed with little ceremony. People of every language and description were sent to the block. The chief victims were the aristocrats of Paris, who had made themselves obnoxious to the common people. The fishwife who had a grudge against some gentleman or his family had but to enter her denunciation with the Revolutionary authorities. The "suspected" party was arrested, thrown into jail, and executed with slight formality. Those in authority were free, of course, to include the objects of their fear, hatred, or jealousy, in the list of proscriptions. It is estimated that no less than 2,800 persons perished in Paris. The principal place of execution was the square now known as Place de la Concorde. The loss of life throughout France was not less than 15,000. See GUILLOTINE.

It should not be forgotten that very few of the people at Paris stood in any fear of the guillotine. The city during the Reign of Terror was not the gloomy place that we might imagine. Never did the inhabitants appear happier, never were the theaters and restaurants more crowded. The guillotine was making away with the enemies of liberty, so the women wore tiny guillotines as ornaments, and the children were given toy guillotines and amused themselves decapitating the figures of "aristocrats."—J. H. Robinson, *History Western Europe.*

Singular city, for overhead of all of this, there is the customary brewing and baking. Labor hammers and grinds. Frilled promenaders saunter under the trees, white-muslin promenadresses, with green parasols, leaning on your arm. . . . In this Paris, are twenty-three theaters nightly; some count as many as sixty places of dancing.—Carlyle, *French Revolution.*

However, when all has been said in excuse and explanation, the Reign of Terror remains a blot upon the history of mankind. If it was begun to save France, it was continued for party ends; and though the leaders were personally incorruptible and were animated, most of them, by lofty motives, the subordinate agents were unspeakably cruel and sordid. At the same time the crimes of the Terrorists do not stand by themselves. They have attracted attention because of the class of society against which they were directed. John Morley, a cultivated and liberal English scholar, calls their deeds "*almost* as horrible as the scenes an English army was to enact six years later in Ireland"; and certainly they were less terrible than the needless vengeance inflicted by the conservative government of Paris in 1871 upon twenty thousand victims of the Commune,—a matter of which the world hears very little.—W. M. West, *Modern Europe.*

Reindeer, rān′dēr, a genus of large deer, represented in America by the caribou. The antlers resemble those of the moose, but are more open and not so large. The reindeer is at home in Lapland where it has been domesticated and takes the place of horse and cow and sheep. Large herds are kept on the barrens, subsisting chiefly on lichens and reindeer moss which they find even under a deep snow. The milk, flesh, hides, and hair are important items in Lapp housekeeping, and are indeed the main dependence of a considerable popula-

tion. The male is from four to six feet in height. It is stoutly built, and has a keen eye, a flying foot, and great endurance. A well bred reindeer will draw a man and sledge ten miles an hour for hours at a time over roads where naught else but a snowshoe could pass. The Laplander is able to name each animal in his herd, though, as Linnaeus remarks, "To distinguish one from another among such multitudes was beyond my comprehension, for they were like ants on an ant-hill." It is said that frozen carcasses of reindeer from Finland and Lapland now appear in the Berlin market each year.

In 1890, under the advice of the Rev. Sheldon Jackson, general agent of education in Alaska, the United States government introduced a herd of reindeer into Alaska. Native Lapp herders were brought with them in the hope of teaching the Indians of Alaska to rear flocks of this useful animal. Up to 1904 Congress had expended $157,000 in the importation and care of 1,280 animals. In October, 1908, the herds numbered 19,322 animals, fawns included. In 1909 Congress appropriated $15,000 for the care of reindeer. It is estimated that the moss region of Alaska is capable of sustaining 10,000,000

By 1920 the original herd of 1,280 deer had increased to about 275,000. Of these, at least 100,000 had by 1920 been slaughtered for food. The remainder were valued, on June 20, 1921, at six million dollars, showing how profitable was Uncle Sam's investment of but a few hundred thousand dollars. Reindeer have for some years been slaughtered and shipped in cold storage to the United States, and the reindeer packing industry is increasing in importance. A few years ago 30 reindeer were sent to the Aleutian Islands; these had increased to more than 200 by 1920. A herd of 40 established on the Pribilof Islands about the same time numbered 317 in 1920. See LAPLAND; ALASKA; MOOSE.

Relativity, a theory propounded in 1905 by Professor Albert Einstein as to the relativity of all motion, and based upon the consideration of the simplest form of motion—uniform, rectilinear motion. To the paper on this subject Dr. Einstein gave the name "Principle of Relativity," but the theory is now commonly called the "special theory of relativity." Simply, the theory is this, that, "it is of necessity impossible to determine absolute motion by any experiment whatever;" or "The phenomena of nature will be the same to two observers who move with any uniform velocity whatever relatively to each other."

With Dr. Einstein this theory was not discovered; it was evolved; it was the fruit of diligent and continued rumination on the philosophical concept of the relativity of all knowledge. The germ of the theory of relativity was in existence before Einstein and even before Newton, who was the first to enunciate with any clarity even a partial theory of relativity. Einstein, after long consideration of the fact that nowhere in the universe is there an immovable, unchangeable standard by which to determine absolute position, absolute time or absolute motion, went beyond Newton and all others who had given the subject any attention, in an effort to determine, even at the expense of all existing "laws," what is the truth regarding time, space, motion, etc.

After publishing the "special theory," Einstein, in view of the fact that this theory would not hold good for all observed or observable phenomena, drew up the "general theory." The latter is not an elaboration of the former, even though the subject matter dealt with by each is much the same. Assuming ideal motion, that is, uniform, straight-ahead motion, and using this as his working hypothesis, Einstein showed that an observer on a uniformly moving system could not detect the motion of that system without reference to some external object. The *force* that pulls an object toward the earth is *gravitation;* the *force* that throws the passenger in a railroad car forward and backward as the train slackens or accelerates its speed is *inertia.* These are the *forces* dealt with by the general theory. But instead of attributing them to different causes, Einstein holds that they have a common cause —*acceleration.* Thus:

If the observer were in a closed room poised in gravitational space and began

to fall with the acceleration common to that field, no gravitational effects would be observed; an object released from the hand would remain where it was and it would be possible to stand, not on the floor alone, but also in space above the floor. If, on the other hand, room and observer began to rise with a constant acceleration, the effects of *gravitation* would be observed; except by unusual effort the observer could not rise from the floor and objects released by the hand would fall to the floor.

In this general theory Einstein makes use of the much discussed *fourth dimension*. This fourth dimension is *time*. It is usual to think of but three dimensions —length, breadth and thickness—and in the everyday world these are sufficient for any kind of calculation. But it has been proved that in measuring immense distances in space it is necessary to subtract from the final measurement the numerical value of the interval of time required for a ray of light to traverse the distance measured. While abstruse, and going deeply into the science of physics, the principle is sound and is valuable in the vast calculations of astronomy.

In putting Dr. Einstein's theories to the test, scientists have found that the non-Euclidian geometers are working on principles more sound than Euclid's; that Newton overlooked a number of valuable facts and seemingly ignored others; and that Einstein's theories are, in the main and almost altogether in particular, correct. Specific instances of observations in confirmation of Einstein's theory were the stellar photographs made in 1919—soon after his general theory became known—on the Island of Principe and at Sobral, Brazil. In this year the solar eclipse was total in these regions and it was possible to measure accurately the deflection of light rays passing near the sun.

Religion, a system of faith and worship. "A belief in spiritual things," says Tyler. The word is Latin, meaning a binding or obligation. Next to a desire for food and clothing, fair lands, and the wish to occupy routes of trade and to win national wealth, religion has played a leading part in the great migrations, wars, and conquests of mankind. The Crusades were, in the main, religious wars. The rapidity with which the Mohammedans overran a large part of the world can be explained only by reference to a zeal to spread their religious views.

Herbert Spencer is of the opinion that there are native tribes so low in the plane of intelligence that they have no religious views. This opinion is not accepted widely, however. Authorities are agreed, usually, that the most primitive people have at least a fear of certain places and of the spirits of the dead. They are afraid of a cave in which someone has died. They make an effort to please evil spirits that they may not be afflicted with disease or visited with disaster.

A very large part of the world's population worships ancestral spirits—the spirits of dead ancestors. Belief in an all-pervading deity is a distinct upward step in the scale of intelligence. In this respect Mohammedanism is to be classified with Christianity and Judaism, rather than with the followers of Confucius.

Separate articles may be found on the principal religions of the world, as well as the leading denominations of Christianity. Shintoism is the ancestral religion of Japan; Taoism, that of a large part of China. The following table is an intelligent estimate of the strength of the leading religions and is doubtless reasonably correct.

Creeds.	No. Followers.
Christianity	477,080,158
Confucianism	256,000,000
Brahmanism	190,000,000
Mohammedanism	176,834,372
Buddhism	147,900,000
Taoism	43,000,000
Shintoism	14,000,000
Judaism	7,186,000
Polytheism	117,681,669

Rembrandt, rĕm′brănt (1606-1669), a celebrated Dutch painter and etcher. He was born in Leyden. His full name was Rembrandt Hermanzoon van Ryn. The father was a well-to-do miller. Having launched four sons in trade, he intended Rembrandt, the fifth son, to be a scholar, and therefore sent him to the Academy of Leyden, "that when he became of age he might serve the city and the republic with his knowledge." But the boy disappointed

expectation and showed no inclination toward books. He would be a painter, and finally his parents allowed him his way. The boy commenced to study art when twelve years of age. At seventeen his education was looked upon as finished, and he began to paint portraits. After a few years he went to Amsterdam where he won immediate success. He married a wealthy woman, Saskia van Ulenburgh, whose portrait he painted many times. Rembrandt established a fine home, surrounded himself with books and pictures, was very popular, and for some years prosperous and happy. In 1642 his wife died. The artist then seemed to lose heart in his work. He continued to paint, but his work was less in demand. Hard times came on and, perhaps through mismanagement, Rembrandt became involved financially and finally went into bankruptcy. His beautiful home and all his costly works of art were sold to satisfy his creditors. Rembrandt was left with nothing. The great painter sank into obscurity and died unnoticed.

Of Rembrandt's paintings, the *Night Watch* is considered his masterpiece. It is in the Museum of Amsterdam. It represents twenty-three personages, officers, soldiers, a standard bearer, and a drummer patrolling the street. *The Syndics of the Cloth Makers* hangs in the same collection. *Saint Paul in Prison* is at Stuttgart; *The Supper at Emmaus* in the Louvre. Rembrandt was noted also as an etcher. *Three Trees, Burgomaster Six, The Death of the Virgin, The Goldweigher,* and *The Cottage with the Great Tree* are noted. The tri-centenary of Rembrandt's birth was celebrated at Leyden and at Amsterdam July 16, 1906, with appropriate exercises. See PAINTING.

Remington, Frederic (1861-1909), an American artist. He was born at Canton, New York. He was educated in the common schools and at the Yale Art School. He began life for himself as clerk in an express office. Accounts of Western life attracted him to save money and go West, where he turned cowboy on a cattle ranch and took his turn in breaking bronchos and rounding up cattle. Remington studied the West with ardor and intelligence. He painted the desert, the Indian, the stage coach, the mountains, the cowboy, the miner, as he saw them and as he himself interpreted them. Mr. Remington first made drawings with pencil and later took up painting and sculpture. He contributed numerous illustrated articles to periodicals and even wrote a Western novel, *John Ermine of the Yellowstone* (1902). Earlier volumes were *Pony Tracks, Crooked Trails,* and *Frontier Sketches.* During the Spanish-American War, Remington turned aside to execute Cuban subjects, but his fame will be handed down to posterity as that of a singularly modest man who left a lifelike original record of a picturesque phase of American life and who was a master of the brilliant coloring, the lonesome distance, and the vast, uplifting influence of the Western plain and mountain. It is quite possible that the future may accord Remington first place among distinctively American artists.

He has made us see at every stage this inferior race (the Indian) which our conquering race has dispossessed beginning with its primeval grandeur, and ending with its squalid degeneration under the influence of our civilized manners. Next, while recording the red man in this way, Remington has recorded the white man who encountered him,—recorded this man also in every stage from dignity to sordid squalor. Pioneers, trappers, cowboys, miners, prospectors, gamblers, bandits,—the whole motley rout goes ineffaceably into Remington's pages. And, finally, he has not forgotten Nature herself. The mystery of the untouched plains and the awe of the unscaled mountain heights have been set down by him not only truthfully, but with potent feeling and imagination. Remington is not merely an artist; he is a national treasure. And if ever it should occur to the not always discerning minds of academic institutions that Remington should be crowned at their hands, I should like to hear him receive his degree in these words: "Frederic Remington, Draftsman, Historian, Poet."—Owen Wister, in *Collier's.*

How true Remington's portrayal of all this is can only be appreciated by those who, like him, have lived the life of the plains, seen the wonderful lights and shadows, existed in the marvelous plains atmosphere, seen the mountains and canyons of that country, and known its people under the excitement of the strenuous life of the border, hunted and camped with the Indians and cowboys, marched with troops under the varying conditions of peace and Indian war. . . . Remington! The name fills our vision with a great sweep of Western country, troops in action, Indians, plainsmen,—all with the strong passions of life stamped on their faces pass in review, responsive to the magic of the master's name.—Major-General Leonard Wood, in *Collier's.*

Remsen, Ira (1846-), an American educator and chemist, president of Johns Hopkins University from 1901 to 1912. He was born in New York City, and educated at the New York City College, the New York College of Physicians and Surgeons and at the universities of Göttingen and Munich. Dr. Remsen was professor of physics and chemistry at Williams College from 1872 to 1876. In 1879 he founded, and afterward edited, the *American Chemical Journal.* When Johns Hopkins University was founded in 1876, Dr. Remsen was chosen to establish the department of chemistry at that institution. He directed the chemical laboratories there from 1876 to 1908. He carried out numerous investigations in organic and inorganic chemistry, and to him is due the credit for the discovery of saccharin. His textbooks have been extensively translated, and he has been honored by American and European scientific bodies. Important in the list of his books are *Theoretical Chemistry, Introduction to the Study of Chemistry, Elements of Chemistry, Chemical Experiments, Inorganic Chemistry* and *A Laboratory Manual.*

Renaissance, rē-nās′sans, in history, an intellectual awakening that began about 1350. The term is from the Latin, meaning a rebirth. Owing to the inroads of the barbarians the customs of the Greeks and Romans had been overthrown and their learning lost. After western Europe settled down gradually to regular methods of life a desire for scholarship arose. The Crusaders prepared the way. The new desire for learning showed itself in the republican cities of northern Italy first. Venice and Florence were leaders. Manuscript copies of the Greek authors that had lain neglected in monasteries for centuries were brought out and copied diligently. The Greek models of architecture and sculpture were studied. The universities at Bologna, Paris, and Oxford were thronged with students. The great buildings and cathedrals of western Europe resulted from this movement.

Renan, ree′nan, **Ernest** (1823-1892), a French student and historian. He was educated at Paris and became professor of Hebrew in the College of France. Differences of theological opinion led him to resign his position, which he did in 1864. He is known chiefly as the author of a *Life of Christ,* a work written from the Unitarian point of view.

Renfrew, Ontario, is on Bonnechere River and Smith's Creek and on the Canadian Pacific and Grand Trunk railroads, 55 miles west of Ottawa. The city is the center of commerce for a large extent of mixed farming territory, and its manufacturing plants are engaged in producing flour, machinery, hosiery, lime, bricks and tile, cream separators, gasoline engines, electrical supplies, truck scales, woolens and finished lumber.

Renfrew has public and separate schools, a library, a collegiate institute, a drill hall and an exhibition building. The waterworks and electric lighting and power plant are owned and operated by the municipality. The population of Renfrew was 4,906 in 1921.

Reni, Guido. See Guido, Reni.

Reno, a city in western Nevada, on the Truckee River. It is the distributing point for a wide territory, handling large quantities of grain, vegetables, and live-stock. Among the important industrial establishments are abattoir and packing-houses, railroad machine shops, an electric power plant, and a brick-making plant. A state hospital for the insane is located there. Educational institutions are the state university, the state agricultural college, a normal school, and a Roman Catholic academy. In 1920 the population was 14,896.

Rent, in law, a profit from lands and tenements in return for their use. Blackstone defines it as "a certain profit issuing yearly out of lands and tenements corporeal." It is payable in money, produce or provisions, and labor. A landlord is the person who owns the land or tenement, and a tenant is the one who occupies it. The landlord and tenant are also known respectively as lessor and lessee. The relations between them are generally drawn up in a contract designated as a lease. The agreement determines whether or not the landlord is required to make repairs, or to be liable either for them or for any injury resulting from imperfect conditions of buildings or premises. The rights of the landlord for the recovery of rent are pro-

tected by law, and many points of issue in regard to the renting of property have been settled permanently by statue law. A ground rent is a rent where the lessee agrees to erect a building on vacant land, or where a lessor reserves his rent, often for several years in advance, on a building lease.

Replevin, the legal process of recovering property unlawfully taken or unlawfully detained by another. In the action a writ is issued in which the person who has taken or is holding another's goods or chattels is named the *defendant*, while the injured party is named the *plaintiff*. The writ authorizes the sheriff to seize and return the plaintiff's property, and the plaintiff must insure by his bond the payment of the damages claimed by the defendant and which caused his action against the plaintiff. If the action be decided in the plaintiff's favor his property is returned to him, or if it cannot be returned he must be given its cash value plus such damages as the court may designate. If, on the other hand, the defendant is successful, he is entitled to such damages as he has sustained as a result of the action.

Rep'plier, Agnes (1855-), an American essayist. She was born in Philadelphia, and was educated at the convent of the Sacred Heart, Torresdale. She writes in the humorous and ironical vein, and her essays possess the further charm of a pleasing and light treatment of subject-matter. Some of her works are: *Books and Men; Essays in Idleness; Essays in Miniature; Varia; Philadelphia: The Place and the People; The Fireside Sphinx;* also a volume of poetry called *A Book of Famous Verse.*

Reptiles. See SNAKES.

Republic, a form of government which proceeds from the people, and in which rulers are elected by popular vote. When not dominated by tyrants the cities of Greece were republican in government. The medieval cities of northern Italy are usually spoken of as city republics. As a matter of fact they were ruled by aristocracies who chose one of their number to act as doge or prince. Thus the doge of the so-called republic of Venice was merely the leader of a small number of wealthy persons who considered themselves the commonwealth. Ordinary people had no rights which anybody was bound to regard. Switzerland is the oldest republic of importance in Europe. The French republic was established in 1870. That set up by the French Revolution was of short duration. A republican, that is to say, a representative form of government is possible only in an intelligent, law-abiding community. See CONGRESS.

Republican Party, a political party of the United States. It was formed in 1854 amid the excitement connected with the repeal of the Missouri Compromise. It was composed chiefly of Northern Whigs, but it drew in the Free Soilers, Abolitionists, and Know-Nothings as well. Republican state conventions were held in this year in Michigan, Maine, Illinois, Massachusetts, Ohio, Indiana, Wisconsin, and Iowa. The name was suggested by Horace Greeley. In the Congress which met in 1855 there were fifteen Republican senators and 108 Republican representatives. Nathaniel P. Banks, a Republican representative from Massachusetts, was chosen speaker of the House. In 1856 a call was issued for a national convention to nominate a candidate for the presidency. It was addressed to "the people of the United States without regard to past political differences or divisions who were opposed to the repeal of the Missouri Compromise, to the policy of the present administration, to the extension of slavery into the territories, in favor of the admission of Kansas as a free state and of restoring the action of the Federal government to the principles of Washington and Jefferson." The convention met at Pittsburg and nominated John C. Frémont for president. He carried eleven states and received 114 electoral votes to 174 for the Democratic candidate, James Buchanan. In 1860 a second Republican national convention met at Chicago and nominated Abraham Lincoln of Illinois for president and Hannibal Hamlin of Maine for vice-president. At the ensuing election, these candidates received 180 electoral votes. The candidates of the three other parties received 123. With the exception of two

terms of Grover Cleveland, the Republicans have held the presidency from Lincoln to Taft. The party went into power in full control both of the Senate and of the House. In this time the party has lost the House four times, in 1875, 1883, 1891, and 1911. It has lost the Senate twice, in 1881 and in 1893. As the dominant political power it has shaped national events for half a century. The management of the Civil War, emancipation, reconstruction, the resumption of specie payments, and the inauguration of civil service reform were achieved by the Republicans. The party also claims credit for the Homestead Act and consequent rapid settlement of the newer portions of the country. It has been the party of high protective tariff, consequently the party to which the manufacturers and moneyed interests of the country have adhered. In recent years there has been a division in the ranks of the party on the tariff question. The old line Republicans still hold to the policy of a high protective tariff; the other branch, known as progressives or insurgents, is attempting to secure a radical reduction in the tariff. It is this branch that combined with the democrats in 1911 to pass the bill aiming at reciprocity with Canada. After a period of eight years the Republican party came to power again in 1920 with Warren G. Harding's election to the Presidency. See HARDING, WARREN GAMALIEL.

Reservation, in American history, a name given to a tract of land set apart for the use of Indians. The Southern States managed to have the Indians removed chiefly to Indian Territory; in the Northern States local tracts of land were set apart. The tracts are scattered through the country from Maine to the Pacific Coast, numbering in all nearly 200 distinct reservations. They are placed under the direct control of national officers known as Indian agents, and are exempt from the operation of state laws. They are chosen usually with reference to water, timber, and game. The general government has made an effort to introduce schools, domestic animals, and to inculcate methods of stock raising and agriculture, but with only moderate success. Although the sale of liquor to reservation Indians is forbidden strictly by law, it goes on nevertheless. Even under the most favorable circumstances, there seems little prospect that the Indians will ever become civilized in the strict sense of the word. As a rule they are fond of hunting, fishing, and trapping. The wild instinct is strong. They do farm and raise stock, but the Indian does not seem to make a thrifty farmer. See INDIANS; INDIAN TERRITORY.

Reserve Officers' Training Corps, The, The Reserve Officers Training Corps is authorized under the provisions of Section 40-47c of the National Defense Act as amended.

The R. O. T. C. system provides opportunity to receive the benefits of military training during the four years of school life of the young man, at a period when he is most receptive, and when such work interferes least with his career. It combines theoretical and practical training, both of which are essential to the qualities of leadership, necessary for officers.

The R. O. T. C. is being conservatively operated in the interest of high standards and economy. In addition to being recognized as our largest and most dependable source of supply for reserve officers it is recognized throughout the country as a valuable asset to the community and to society, in that it makes for better citizenship in addition to preparing military leaders.

Requests for R. O. T. C. units from many schools are being denied to avoid exceeding the available resources in funds and in army personnel.

At the present time there are 104,139 students enrolled, of which 64,742 are in senior units in colleges, and 37,387 in junior units in public schools and military academies. There are 238 senior units and 100 junior units.

Units of the various branches of the army are now established as follows:

98 Infantry.
11 Cavalry
20 Field Artillery
19 Coast Artillery
11 Signal Corps
21 Engineer Corps
8 Quartermaster Corps
8 Ordnance Department
24 Medical Department

6 Air Service
4 Veterinary
8 Dental

A total of 225 institutions of learning are concerned, ranging from the leading universities such as Yale, Harvard and Princeton, to public schools in various communities, as in Chicago, Cleveland, San Francisco and Atlanta.

Adequate equipment, animals and personnel are furnished to conduct instruction in each of the arms noted above.

One of the distinctive features of the reserve officers' training corps is its real democracy. It is as democratic as was the operation of the draft. It exists in every state. It knows no distinction of race, color or creed. It is found in the private and public schools, in the technical colleges, in the state universities, etc., in every section of the country, including Hawaii and Porto Rico.

Individual merit alone counts for advancement. Wearing the same uniform provided by the government, the son of the millionaire and the son of the laborer share equally its benefits. Rich and poor, high and low, receive the same training. The disciplinary training makes for better citizenship, the physical training for healthier men, and the patriotic inspiration for loyalty to country. During the summer camps of 1919 the average gain in weight of the students attending was five pounds, the chest development showed similar benefit.

Summer camps of instruction are provided for in the law, and it is so arranged that students may attend one or two summer camps of approximately six weeks each during their four years at college. One of these camps (in the first two years) is voluntary; the other is compulsory for the students in the last two years of training and such students receive seventy cents per day while actually in camp. Students receive, under the law, transportation to and from camps, subsistence, medical attention, and the use of uniforms and equipequipment.

Twenty-eight camps were conducted in the summer of 1922 at which some 5,200 students were in attendance, receiving intensive practical instruction for infantry, artillery, cavalry, engineers, ordnance, motor transport, air service, signal corps and medical. A much larger attendance would have resulted but for restrictions necessarily placed on attendance because of the limited funds available. Plans are now under way for the opening of 30 R. O. T. C. camps June 14, 1923, with an estimated attendance of 8,500.

$4,000,000 was appropriated for the fiscal year 1920, $3,000,000 for 1921, $2,896,553 for 1922, $3,100,000 for 1923 and $3,500,000 for 1924.

The R. O. T. C. system has proven its value; approximately 2,600 reserve officers were produced by it in the academic year finished in 1922, as compared with approximately 1,100 the year before. See OFFICERS' RESERVE CORPS.

Resin. See TURPENTINE.

Resistance. See OHM, GEORG SIMON.

Respiration, a physiological function, the object of which is the taking in of oxygen and the giving out of carbon dioxide by the lungs. Inspiration is the act by means of which air is inhaled by the lungs, and the process of exhalation is called expiration. Respiratory action is involuntary, but it can be modified and partly controlled. Breathing is the change of air that is effected with each act of respiration. The normal rhythm of adult breathing is from eighteen to twenty respirations per minute. The quantity of air that is exchanged upon breathing is from twenty to thirty cubic inches, and during twenty-four hours about 680,000 cubic inches have been inhaled and exhaled by an adult. The rate varies and is dependent upon physical condition, increasing by exertion, cold, and certain forms of illness; decreasing in sleep and old age, and in diseases affecting the respiratory organs. Costal breathing (breathing in the chest) is more natural to women, and men make more use of the abdominal type of respiration. Resuscitation, or artificial breathing is resorted to when death is imminent as a result of prolonged exclusion of air from the lungs. This may have been caused by drowning, hanging, or exposure to chloroform and other gases. Three methods of artificial respiration are generally employed: in-

sufflation, known as Fell's method, when air is blown into the lungs either by a mouth-to-mouth process or by use of bellows; manual methods used by Sylvester, Marshall Hall, and Howard, whereby the chest-walls are expanded by means of external manipulation; and electrical stimulation of the muscles which control the respiratory organs. See LUNGS; DROWNING.

Retina. See EYE.

Revelation, Book Of, the last book of the New Testament, also known as the Revelation of Saint John the Divine. The authorship is not definitely known, but is generally ascribed to the Apostle John, who is supposed to have written the book during the term of his banishment in the Isle of Patmos.

There have been a great many controversies about the authorship of the Book of Revelation, and also as to its meaning. Some biblical scholars have thought it foretold the events to precede the end of the world, and there have been numerous other interpretations of the prophecies. Those who believe that the Apostle John was the author of the book, think that the visions described were seen in A. D. 96, and that the work was written in 97, during the reign of the Emperor Domitian. Another opinion, which is more recent, is that Revelation interprets the symbolism of the Old Testament in the light of the doctrines of Christianity.

Revelstoke, British Columbia, is on the confluence of the Columbia and Illecillewaet rivers at the foot of the western slope of the Selkirk Mountains, 267 miles west of Calgary and 380 miles northeast of Vancouver. It is served by steamers on the Columbia, and by the Canadian Pacific and the Grand Trunk Pacific railroads.

The city is the commercial center for a mining and agricultural district, and in its factories are made such varied articles as sash and doors, finished lumber, shingles, machine shop products, cigars, and alcoholic beverages. The Canadian Pacific Railroad has repair shops here.

Revelstoke is surrounded by natural beauty and has been made highly attractive with paved streets, parks and boulevards. The city is a tourist center and is visited by hundreds of pleasure seekers each year. A motor road leads southward from Revelstoke through Gold Range, Eagle River and Okanagan Valley and into the United States. In 1921 the residents numbered 4,350.

Revere, Paul (1735-1818), an American patriot. He was a native of Boston. He was trained to the trade of an engraver and silversmith. The plates used in printing the first paper currency in Massachusetts were engraved by him. His signature also appears on engravings of Samuel Adams, King Philip, and the Boston Massacre. He took part in 1756 in the expedition against Crown Point. When the troubles of the Revolutionary War drew on he was one of Samuel Adams' most active assistants, and was one of a volunteer band of mechanics who patrolled the streets of Boston to observe the movements of the British troops. On the evening of April 18th, 1775, the day before the battle of Lexington, it was arranged that he should station himself on horseback on the northern shore of the Charles River. In case the British troops made ready for an expedition a lantern was to be hung in the old North Church tower. At 2:30 in the morning the troops landed on their way to Lexington, but Paul Revere was off on his "midnight ride," two hours in advance of them. As told with reasonable accuracy in Longfellow's famous poem, he gave warning to the minutemen at Lexington and Concord. During the war Revere rose to the rank of lieutenant-colonel of artillery. At the conclusion of peace, he resumed his trade as a gold and silver smith. He later enlarged his business by the establishment of a foundry for the manufacture of bells and cannon. He is credited with being the first American to smelt copper ore and to roll copper into sheets and rods. See LEXINGTON; CONCORD.

Revolution, a radical change in government or in social affairs. An unsuccessful military uprising is termed usually a rebellion. A successful attempt to overturn the government is a revolution. The English Revolution of 1688 was a comparatively bloodless affair. It resulted in the driving

of James II, the last of the Stuarts, from the English throne, and the coronation of William and Mary. The American Revolution is called also the War of American Independence. Hostilities began with the battle of Lexington, April 19, 1775, and closed with the surrender of Cornwallis at Yorktown, October 19, 1781. A peace guaranteeing the independence of the American colonies was concluded with Great Britain in 1783. The French Revolution, the last of the three great revolutions of modern history, may be said to have begun with the convocation of the States-General in 1789. It resulted in the downfall of French feudalism, the practical destruction of the French monarchy, the substitution of the Empire of Napoleon for that of Louis XVI, and the ultimate establishment of the French republic. All three revolutions resulted in distinct gains for the cause of popular government. The change from the domestic to the factory system of manufacturing is known in Great Britain as the Industrial Revolution. See FRENCH REVOLUTION; REVOLUTIONARY WAR.

Revolutionary War, the war by which the British colonies in America won their freedom from the mother country and set up as the confederation of states that developed into the United States of America, had its immediate source in the proclamation issued by George III of England in 1763 to the effect that all the land between the Alleghany Mountains and the Mississippi River should be reserved to the Indians. George III was weak, and he though that thus confining colonization to the Atlantic Coast would make Britain's rule of America a simple matter attended by no dangers. In the French and Indian Wars, at the conclusion of which England came into possession of the French American possessions, a sum of $350,000,000 had been spent by the home country and $130,000,000 by the American colonies. The mother country now demanded of the colonists not only that they pay a large part of the $350,000,000 but also that they help to support an army of 10,000 men which George proposed sending to America to protect the colonists from the Indians and to hold the newly won French territory. Stamp taxes were to be levied on the colonies to meet these expenses. The immediate reply of the colonists was that they had protected and could still protect themselves from the Indians, and that the affairs of Canada (the French territories, that is) were not their concern.

The colonists had previously had many minor causes of complaint, but loyalty to the home country had in large measure stilled their voices. Now, however, while admitting the right of the home government to lay a tax upon imports and exports, they denied its right to tax the industries of the colonies, and further denied its right to levy taxes without allowing Parliamentary representation. The burden of the colonists' complaint was "Taxation without representation is tyranny." As in all instances of revolutionary excitement, one grievance suggested another until the colonies were soon aflame with protests.

In 1765 an Act of Parliament was passed for the purpose of raising funds by means of stamps which were to be attached to legal documents, business papers and many articles of every day use. This Act further inflamed the colonists; riots occurred; and in September the Stamp Act Congress met at New York. Nine colonies were represented, and a statement of grievances and a declaration of rights were issued. The stamps sent to America were destroyed or returned, and so vigorous did the protests become that in 1766 the Stamp Act was repealed.

Meantime the home government was becoming more confused and unreasonable, and was altogether blind to the danger of its policy. In 1767 a tax was levied on glass, tea, paper and printer's colors. Colonial merchants entered into a non-importation agreement, and it became necessary to furnish Governor Gage with a military detachment in order to enforce the laws of the colonies. On March 5, 1770, a mob of citizens attacked the soldiery at Boston; the troops fired on the crowd and several people fell dead. Excepting that on tea, the duties mentioned above were discontinued in 1773. The colonists, however, resolved that as a matter of principle

they should pay no duties. Followed the Boston Tea Party, (which see) December 16, 1773, when a crowd of colonists disguised as Indians threw three ship loads of tea into Boston Harbor. The home government foolishly answered this affront by passing such punitive measures as the Acts restricting the independence of town meetings, and declaring Boston to be no longer a port of entry.

Though George III and his chief supporters acted unwisely at every turn in the negotiations that preceded the war, there were in England a number of statesmen who saw danger ahead and were anxious to avoid it. One of the most wholehearted champions of the colonists was Edmund Burke (see BURKE, EDMUND), who repeatedly pled for a saner attitude toward the colonists and a recognition of their rights, of which he was extremely sensible. Another was William Pitt, Premier at the time the war began. (See PITT, WILLIAM.) But the efforts of these and other men were unavailing. The colonies were without advantage of foreign trade and their Newfoundland fishing rights were abrogated. Nothing remained but war.

THE WAR. All over the colonies preparations for war were made. Arms and ammunition were hurriedly gathered, and the beginnings of a military organization were made. At Salem the British commander, General Gage, attempted to seize some cannon that the colonists had gathered, but the attempt failed. Then he sent a force to destroy the munitions that he believed were hidden at Concord. It had been arranged that if this move were made the patriot Revere was to ride at night through the villages and towns to arouse the people. (See REVERE, PAUL). On April 19, 1775, a handful of colonists under Captain John Parker opposed a British force under Pitcairn at Lexington. The British fired and seven colonists were killed. Pitcairn then moved on to Concord, where he destroyed all the stores he could find. At Boston, Gage was reinforced by troops under Howe, Burgoyne and Clinton. He issued a proclamation demanding that the rebels lay down their arms and threatening death by hanging to all who disobeyed. The order was ignored; Congress appointed George Washington commander-in-chief of the American forces; and both sides prepared for the break. Gage attempted to seize Bunker Hill, an eminence near the city of Boston (see BUNKER HILL), but the Americans opposed him. In the battle that followed the American losses were heavy and they were driven from the position, but the British losses were heavier. This battle also proved to the British that the colonists were determined to resist with all their vigor. On July 4, 1776, the Continental Congress issued the Declaration of Independence (which see).

After this document was published the American forces carried a new flag, designed to show their political separation from the mother country. Washington had gathered a heterogeneous but determined army; with this he had besieged the British at Boston, which the latter evacuated on March 17, 1776. In 1775 a force under Montgomery had been sent to invade Canada via Lake Champlain, and another force, under Arnold, had been sent against Quebec. Montgomery took Chambly, St. Johns and Montreal, but in the unsuccessful attack on Quebec he was killed and Arnold was wounded. While these events were happening Washington had forced the British out of Boston.

From 1776 to 1778 the war was waged principally in New York. Washington went to the limits of his ability to hold the city of New York against Howe, who had returned from Halifax with a large force; but the Battle of Long Island was won by the British and Washington withdrew from New York, crossing the Hudson and retreating under heavy fire toward Philadelphia. Washington was mercilessly pushed and was forced to wreck bridges and build barriers to avoid being overwhelmed by his pursuers. He reached Trenton and there made his famous Delaware crossing to Philadelphia. Cornwallis had led the pursuit, and he now settled down at Trenton, having no boats with which to cross the Delaware. On Christmas night, 1776, Washington recrossed the

river and in a surprise attack defeated Cornwallis in the Battle of Trenton. He then moved on to Princeton and again defeated the British. These were the first real victories of the American forces and the moral effect was incalculably good.

Then followed a series of minor defeats for the Americans, who were outmaneuvered by Howe. Washington went into quarters at Valley Forge (which see). The British began attacking from the north and laid a plan to capture Washington's army. But the plan miscarried and at Saratoga General Gage captured Burgoyne's entire force. (See FIFTEEN DECISIVE BATTLES.)

Then the French came to the aid of the colonists, 1778. In that year Howe was removed from his command, being replaced by Sir Henry Clinton. The latter evacuated Philadelphia. Washington followed him to Monmouth, forced a fight, and won. In the summer of 1778 a French fleet and a land force came to the aid of the Americans.

The British held a large extent of territory in the South, but in a series of defeats, administered first by a force of backwoodsmen and later by the regulars, they gradually lost control. King's Mountain, Cowpens, Guilford Court House and Eutaw Springs were the principal battles fought in this region. Cornwallis led the British army of the South for a time, but he went north to rearrange his affairs, leaving the main British force at Charleston. After collecting reenforcements he started for Charleston to aid the force he had left. But Washington had come down from the North and the French fleet had entered Chesapeake Bay; Cornwallis was forced into quarters at Yorktown, and after withstanding a siege for 43 days he surrendered, October 19, 1781. Sporadic fighting continued for some months; a provisional peace treaty was signed at Paris in November, 1783; and on September 3, 1782, the Treaty of Paris was signed and the states were free.

Revolver. See COLT, SAMUEL.

Rexford, Eben Eugene (1848-1916), an American poet, song-writer, and authority on gardening subjects, famous for his composition of *Silver Threads Among the Gold*. Mr. Rexford did not, however, devote his entire time to the composition of songs, as he was a noted authority on horticulture and floriculture, and for many years edited the "Gardening" department of the *Chicago Tribune*. He was also organist in the Congregational Church at Shiocton, Wisconsin, where he took an active part in charitable work of all kinds. Mr. Rexford published a number of authoritative books on plant life, including: *Home Floriculture, Grandmother's Garden, Flowers—How to Grow Them, Four Seasons in the Garden, The Home Garden, The Indoor Garden and Amateur Garden Craft.*

Reykjavik, Reikiavik, or **Reikjavik,** the capital of Iceland and the home of the minister or leading presiding officer of the Danish dependency.

The city, ice bound many months every year, is visited in the summer by a steamship bound for Copenhagen. A university and several other schools are in the city, which has a population of about 15,000.

Reynard The Fox, an epic fable of the Middle Ages, in which the speakers and actors are animals, the fox being the hero. The author signs himself Henrik van Alkmer, but he is thought to have been Hermann Barkhusen, town clerk and printer of Rostock, writing under a pseudonym. The fable was written in low German in 1498. It is in verse, and though satire is not preëminently the aim of the author, general touches bearing directly on the life of the time are easily distinguished. The fable spread from Flanders to all lands and exists now in a great number of versions. The story of Reynard runs as follows: When all the animals were summoned to the court of the lion, the king of the animals, to do him obeisance, Reynard the Fox did not appear. Messengers were sent out to find him, and when he finally appeared he was condemned to death. He asked to make a speech before he was brought to the gallows, and in the course of it told that he held in his possession the treasure of the king, which had been stolen by old Reynard, his father, the wolf, and the bear. The king pardoned him, but when various misdeeds were reported and

no treasure was restored the lion finally declared him an outlaw.

Reynolds, rĕn′ŏlz, **Joshua** (1723-1792), an English painter. He was the first president of the Royal Academy. He was a friend and intimate of Samuel Johnson and Edmund Burke, and a member of the famous Literary Club. We are indebted to Reynolds for the portraits of the distinguished London people of his day. At the height of his fame he painted a hundred portraits a year and employed many assistants. Many of his paintings are now worthless through use of poor paint. At death he was accorded burial in St. Paul's. See PAINTING; WEST.

Rhapsode, or **Rhapsodist,** a name given by the ancient Greeks to their wandering minstrels, who sang the Homeric and other poems. Each separate song or ballad was called a rhapsody. It was by means of the rhapsodes that these poems were preserved before they were committed to writing, and thus made generally accessible. An important step in the development of Greek tragedy was made when Thespis arranged a sort of dialogue between the leader of a chorus and a rhapsode at the Dionysian festival. The Greek rhapsode corresponds to the scâld of the Scandinavians, the French trouvère, the Celtic bard, and the Anglo-Saxon gleeman. The word rhapsode means literally, "one who strings songs together." See MINSTREL; BARD; BALLAD.

Rhea, in Greek mythology, the goddess of the Earth. She was the daughter of Uranus and Gaea; she became the wife of Cronus, and mother of Zeus, Poseidon, Hades, Hera, Hestia, and Demeter. She was worshipped especially in Crete. She was early identified with Cybele. The Romans identified her with their Ops.

Rhea, or **Rea Silvia,** in Roman legend, a vestal virgin. She was the mother, by Mars, of Romulus and Remus. She is called also Ilia.

Rheims, rēmz, a city of France. It is situated on a small stream 100 miles northeast of Paris. It is connected with the capital by canal and railway. The city nestles among vine-clad hills and is the center of the champagne industry. The wines are stored in large cellars excavated in the chalk cliffs. There are 150 miles of passages rivaling the catacombs of Rome in extent. Thirty million bottles a year are stored away to mellow. There are also extensive manufactures of flannels, merinos, blankets, and other woolen goods, as well as of candles, soap, glass, and paper. The city is noted also for its gingerbread, biscuit, and dried peas. The city was seriously damaged during the Great War. The population in 1921 was 76,645.

Rheims is a city of historical importance. In the day of the Roman Empire it was the terminus of a military road. A triumphal arch 108 feet in width and forty-three feet high still stands. Clovis and his soldiers were converted to Christianity at Rheims. The crowning feature of the city is a magnificent cathedral dating from the thirteenth century. The front or façade is one of the masterpieces of the Middle Ages. It is pierced by three portals, laden with sculptured figures. A rose window set above the main portal is one of the finest specimens of stained glass known. The front towers, one at each corner, are unfinished. They stop at a height of 267 feet. The design calls for pointed spires 394 feet high. For centuries the kings of France were crowned here. The interior, designed to hold the vast crowds that surged to the coronation, is 455 feet in length. The nave is ninety-eight feet wide and 125 feet in the clear. It is surrounded by beautiful galleries adorned with sculpture. Priceless tapestries and an organ with 3,516 pipes increase its impressiveness. The church is now but a memory and a ruin, for the Germans, by aerial attack and long range artillery, damaged this magnificent structure beyond repair.

Rhetoric, in general, the science and art of expression. It includes, but goes beyond grammar, which deals only with words and sentences. Rhetoric has to do with the relation of sentences to each other, with the paragraph, and finally with the discourse as a whole. Moreover, while grammar aims at correctness, rhetoric must seek for the most efficient forms of expression. Rhetoric precedes, and in a sense, is founded upon logic which is the science of thought, the science of exact reasoning. The laws of thought, which it is the province of logic to investigate, rhetoric

must observe, but rhetoric seeks to make the expression of the thought, which it has found to be true, clear, forcible, and attractive.

In so far as the principles of rhetoric may be set forth systematically, it is a science. As a subject appearing upon the curriculums of high schools and colleges, rhetoric is primarily an art. Its principles are studied, not that the learner may acquire systematized knowledge, but solely that he may apply them to practical ends. Slightly modifying the definition of John F. Genung in his text-book, *Practical Rhetoric,* we may say that the student learns to adapt discourse, in harmony with its subject and occasion, to the requirements of a reader or hearer.

Whether or not the word rhetoric be used, the study of this art begins usually with the work in English composition in the high school. The various forms of discourse, narration, description, exposition, and argumentation are studied from the works of the best authors, and practice given in producing them. The two departments of rhetoric, style and invention, receive attention. In correlation with his work in literature and his general reading, the pupil is led to recognize the various qualities of style and to judge of their relative importance. He learns also how to find material for various forms of discourse, how to select what is good, and to reject what is trivial or irrelevant; how to arrange his material logically; how to develop incident into complete narration, and how to present facts so that they may be convincing. Of first importance throughout the course is actual practice in the art of writing, and it is safe to say that the success with which the subject is taught is commensurate with the amount of such practice required.

Rheumatism, a disease affecting the joints and muscles of the body and characterized by inflammation of the connective tissues and localized pain. The disease may be acute or chronic. Acute rheumatism is recurrent. Articular rheumatism is generally caused by cold and dampness, in many cases it is hereditary, and it affects adults between the ages of fifteen and thirty as a rule, being rare before ten or after fifty. There is swelling of the joints, high fever, excessive perspiration, and intense pain. Heart trouble often accompanies this disease. Chronic attacks are attended by less pain but the joints are often stiffened and enlarged to the extent that deformity is produced. The causes of chronic are practically the same as those of acute rheumatism, the chronic often being a development of the other. Persons over forty are most liable to attacks and the pain is felt most keenly immediately before a change of weather. Muscular rheumatism affects the connective tissues of muscles and is very frequent. It is often neuralgic and arises from causes similar to those of the other forms of rheumatism, such as cold and dampness. There is little swelling or redness, but cramping of the muscles. It is a disease of youth and adults, in character. Lumbago, one form of rheumatism, affects the muscles of the back and is accompanied by brief attacks of acute pain. Inflammatory rheumatism in the most intense form of the disease and when it reaches the heart causes death. Sciatica, often classed as rheumatism, is really a neuralgia of the sciatic nerve.

Rhine, the most celebrated river in Europe. It is formed by the union of several mountain streams in eastern Switzerland. It flows northward into Lake Constance, then turns westward, forming the boundary between Baden and Switzerland, as far as Basel. It then turns nearly due north and flows through western Germany into the Netherlands. It empties into the sea through several channels known by various names. The total length is about 800 miles. The drainage area is about 86,600 square miles. The ultimate source is a small lake on the slope of the St. Gothard, 7,689 feet above the sea. The Rhine varies in volume—at different places and at different seasons of the year. At Mainz it is about 500 yards in width and from five to twenty-five feet in depth. At Cologne the depth is from ten to thirty feet. At the Dutch frontier the depth is not far from sixty feet. At Schaffhausen, below Lake Constance, are the Falls of the Rhine, the most beautiful cataract in Europe. Still lower in its course there are several rapids and dangerous shoals. One of these is the

scene of the celebrated poem, the Lorelei. Above Bingen the river has low banks, giving it a lake-like appearance. Below Cologne and Düsseldorf the country is flat and monotonous.

The district between Bingen and Cologne is the picturesque part of the Rhine—the Rhine of literature and of history. The river here passes between precipitous banks and sweeps around lofty promontories. The river bears itself in a lordly, swelling way, as though aware of its own importance. Little villages nestle at the foot of the cliffs. Every now and then the valley widens sufficiently to give footing for a town or city of considerable size. Wherever the bluffs have a southern exposure they are clothed with vineyards and fruit orchards. Lofty and seemingly inaccessible, yet castle-crowned, crags look down over the wide, winding expanse of the river. This section of the Rhine is without doubt the most frequented scenic region in Europe. Over 100 passenger steamers ply its waters, conveying upward of 1,000,000 passengers annually. The trip from Cologne to Mainz occupies about twelve hours; the downward trip about seven hours and one-half. Steamers touch at the piers of the principal points. Light skiffs lie in waiting to take off passengers almost anywhere. The banks are so precipitous and the channel turns so abruptly that at times it seems as though the steamer were going into a pocket, yet, ere the end is reached, another expanse opens out before.

"The castled crag of Drachenfels"; the Seven Mountains, with their thirty peaks; the beautiful island of Nonnenwerth; the quaint old town of Andernach, with its picturesque crane and the "Watch-Tower on the Rhine;" the Bridge of Boats at Coblenz; the lofty fortress of Ehrenbreitstein; the octagonal King's Seat, where electors met to choose an emperor; the rocks of the Lorelei, the pentagonal tower of the Pfalz; the queer old fortifications of Bacharach; the Mouse-Tower of the Rhine; Bingen, and Niederwald Monument;—with vineyards, castles, and half hidden spires crowd the day's journey from Cologne to Mainz with pictures of unsurpassed beauty.

The Rhine is the river of song and story. It is celebrated in the myth of Siegfried and the Nibelungenlied. It has long been the historic waterway of Europe. Caesar crossed it on a bridge of timbers. Invading hordes of Goths, Vandals, and Germans crossed the Rhine repeatedly. The Rhine is the cradle of German civilization, the river of the German Fatherland. Its passage is today disputed by the strongest fortifications in inland Europe

The Rhine country has excellent accommodations for travelers. In addition to steamers, a macadamized road follows each bank. Villages and comfortable inns are found every mile or two, giving these roads the aspect, almost, of continuous streets. Stage routes branch off every few miles. Counting steamships and sailing ships there are thousands of freighting vessels on the Rhine. Rafts of timber float slowly down to the Dutch markets. The fisherman sits idly in his boat waiting for salmon, sturgeon, pike, or carp. The gardener's wife clatters along the road in wooden shoes sharing with the house dog the task of drawing her vegetable cart to market. Rivulets come tumbling down the cliffs. Cool springs break out from the rocks. In autumn, when the air is cool and leaves are changing color, when luscious grapes are abundant and morning mists obscure the reaches of the river and the gray old castles above, the Rhine region is a paradise for the bicyclist.

The Rhine figured largely in the World War, especially that part of it having to do with the "western front." In the peace councils following the armistice the historic river became a point of contention in the allocation of boundaries. American troops crossed the river into Germany in 1918, and allied forces occupied a number of small areas along its banks. See MAINZ; BINGEN; COBLENZ; EHRENBREITSTEIN; MOSELLE; BONN; COLOGNE; DUSSELDORF.

Rhinoceros, ri-nos′e-rŏs (Greek, nose-horned), a powerful, thick-skinned animal next to the elephant in size. It is exceedingly heavily set, bulky, and clumsy, with a pig-like body about five feet in height and from eight to ten feet in lengh. A large specimen often weighs 6,000 pounds. The hide is almost hairless, excepting the tip of the tail and surfaces of the ears, and is so

One-horned rhinoceros.

Two-horned African rhinoceros.

THE RHINOCEROS.

thick and hard that it covers the body like plates of sole leather with a few wrinkles to permit movements of the limbs and head. The feet are broad and flat like those of an elephant, but each foot has three separate toes armed with hoof-like claws. The neck is thick and short, the ears are rather long, and are not unlike those of the pig. The eye of the rhinoceros is small and so deeply set that it is unable to see either straight ahead, or backward. It is obliged to turn its body sidewise like a pig, if it wishes to look straight ahead. The snout is long but the jaws are of equal length. The rhinoceros does not have a trunk, but its upper lip is long and pliable, enabling the animal to seize grass or other food. There are several species confined to Africa, southern Asia, and the Indian Archipelago. The upper lip of the Indian species is armed with a horn, sometimes three feet in length and not less than six inches in diameter at the base. It is an outgrowth of the skin, like a tuft of hair, and has no connection with the bone of the upper jaw. It is a terrible weapon of defense against the tiger or other animal unwise enough to attack it, and also useful in rooting, for a rhinoceros is fond of digging after the manner of a hog. The small rhinoceros of South Africa has two horns, one behind the other. It is very fond of wallowing in mire like the hog. In captivity, it lives on any forage that cattle will eat. In geologic times wooly species were companions of the mammoth in Arctic regions. Fossil remains have been found in North America also. See ELEPHANT; HIPPOPOTAMUS; TAPIR.

Rhode Island, a state of the New England group and the smallest in area in the Union, is commonly called "Little Rhody." The state has a total area of only 1,248 square miles. The boundaries are Massachusetts on the north and east; the Atlantic Ocean on the south; and Connecticut on the west. In the extreme southwest it is separated from Connecticut by the Pawcatuck River.

THE PEOPLE. By the fourteenth United States census the population of Rhode Island was 604,397, giving the state thirty-eighth place; but, when the area is considered, this population is large—566.4 to a square mile; thus it is more densely populated than any other state. The people are 97.5 per cent urban, and are thus more exclusively city dwellers than are the inhabitants of any other state. The reason for this will appear later. The capital and largest city is Providence, with a population of 237,595. Four other cities have more than 25,000 residents, and six towns have between 10,000 and 25,000.

SURFACE AND DRAINAGE. In appearance the surface of the state resembles the Piedmont sections of, say, North and South Carolina; the average elevation is about 225 feet, the highest points being in the northwest. Here the greatest height is Durfee Hill, 805 feet. Toward the southwest the land flattens out, terminating at the coast in broad, sandy marshes in which are numerous ponds. Narranganset Bay cuts inland for 28 miles on the eastern edge of the state, and varies from three to twelve miles in width. In the bay are many islands; the largest, and the one for which the state is named, is Rhode Island. The bay and Pawcatuck River are the only considerable inlets. The rivers are small, but some are swift and have falls that generate power. Though called rivers, the Providence and Sakonnet are really arms of Narraganset Bay. The most important rivers are the Providence, Blackstone and Pawtuxet, which flow into the north end of the bay, and the Pawcatuck, in the southwest. The climate is mild and healthful, and the state is popular with summer tourists. The famous summer colony, Newport, is on Rhode Island.

MINERALS. Granite is the most important mineral product of the state. The granite quarried is of the first quality. Other minerals found in small quantites are coal, graphite, iron, limestone and clay.

AGRICULTURE. Though only 2.5 per cent of the population is rural, the agricultural industry is proportionately flourishing. Practically all temperate zone crops are raised, the largest being corn. Potatoes, oats and hay are next in importance, and garden vegetables and poultry are raised in good quantities.

MANUFACTURE is the mainstay of the

state. The last industrial census gives 2,466 as the number of factories, more than have many states in which several Rhode Islands could be lost. Iron working in the oldest industry. The first factory in America for the production of cotton cloth was established at Pawtucket in 1787. Woolen, worsted, and cotton cloth, silk, hosiery, knit goods, laces and clothing are the chief products of the flourishing textile industry. Of metal products, jewelry is most important; other metal products are fine tools and delicate machinery, screws, files, electrical supplies and appliances, silverware, mechanics' tools and foundry and machine shop products. Another important product is rubber goods. The principal manufacturing centers are Providence, Pawtucket, Woonsocket, Cranston, Central Falls, Westerly and West Warwick.

TRANSPORTATION. The state has 214 miles of railroads and ample electric railway service, and also has water connection with other coast cities. The chief steam road is the New York, New Haven & Hartford. Providence River is navigable to the city of Providence, and the Seekonk, a lower reach of the Blackstone, as far as Pawtucket.

CHARITIES AND CORRECTIONS. The state institutions that come under this head are supervised by a board of public welfare. The institutions are the State Hospital for the Insane, State Almshouse, State Tuberculosis Hospital, Rhode Island Soldiers' Home, Sockanosset School for Boys, Oaklawn School for Girls, State Home and School, Exeter School, workhouse and house of correction and the penitentiary.

EDUCATION. Elementary education is compulsory, and in 1920 was provided for by the maintenance of 2,588 primary and grammar schools. In the same year there were 23 public high schools, a State College of Education for training teachers and, Rhode Island State College, a Federal state institution. Other institutions are the Rhode Island School of Design, Rhode Island Institute for the Deaf, Brown University, Providence College, Rhode Island College of Pharmacy and Moses Brown School. Rhode Island enacted the first state free school law in 1800, established the first public school in 1640 at Newport, appointed the first superintendent of school in 1837, and conducted the first state survey in 1844.

GOVERNMENT. Rhode Island is governed under the original constitution adopted in 1842, after 179 years of government under a charter granted in 1663 by King Charles II of England. The constitution has been many times amended.

The General Assembly is divided into a senate and a house of representatives. Members of the senate are the lieutenant-governor and one senator from each of the thirty-nine towns and cities. The house has 100 members, elected on the basis of population.

Executive power is vested in the governor, lieutenant-governor, secretary of state, attorney general, treasurer, auditor and commissioner of education.

The judiciary consists of a supreme court of one chief justice and four associate justices, a superior court, 12 district courts and municipal courts. The district court judges sit also as justices in juvenile courts.

HISTORY. All of the original settlers of Rhode Island were seekers after religious freedom. Roger Williams and other refugees from Massachusetts founded "Providence Plantation" in 1636, and in 1638 a settlement was made at Portsmouth on Rhode Island by John Clarke, Anne Hutchinson and others who sought freedom of worship. A group seceded from Portsmouth in 1639 and founded Newport. In 1642 a fourth settlement was made at Warwick. In 1644 Williams secured from Charles I a charter that bound the settlements together under the name of "Providence Plantations." The charter of "Rhode Island and Providence Plantations" was secured in 1663, and under this the colony and state were administered until 1842.

The little colony, at peace with the Indians, was a vigorous defender of American rights before and during the Revolutionary War. The General Assembly declared the state independent of Great Britain on May 4, 1776, two months before the Declaration of Independence by Con-

gress. During most of the Revolutionary War the British were in possession of Newport and a brilliant battle was fought on the Island of Rhode. The Rhode Island troops were conspicuous for bravery in battle, and Nathanael Greene, next to Washington the ablest American commander, was born in Rhode Island.

Rhode Island furnished also the first American admiral, Esek Hopkins. The state was the last of the original thirteen to ratify the Federal Constitution withholding approval until the original Constitution had been amended to include the Bill of Rights, with the assertion of religious freedom demanded by Rhode Island.

With the introduction of cotton spinning and weaving the people turned from shipping and agriculture to manufacture, which soon became the dominating industry.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	1,067
Water area, square miles	181
Forest area, acres	250,000
Population (1920)	604,397
White	593,980
Negro	10,036
Foreign born	173,499
Chief cities:	
Providence	237,595
Pawtucket	64,248
Woonsocket	43,496
Newport	30,255
Cranston	29,407
Number of counties	5
Members of state senate	39
Members house of representatives	100
Salary of governor	$8,000
Representatives in Congress	5
Assessed valuation of property	$1,003,864,000
Bonded indebtedness	$9,162,971
Farm area, acres	331,600
Improved land, acres	132,855
Corn, bushels	644,000
Potatoes, bushels	345,000
Domestic animals:	
Horses	6,540
Milk cows	30,519
Sheep	2,736
Swine	12,869
Manufacturing establishments	2,466
Capital invested	$594,337,448
Operatives	139,665
Raw material used	$415,989,203
Output of manufactures	$747,322,858
Miles of railway	214
Teachers in public schools	2,971

Rhodes, Cecil John, (1853-1902), a British financier and statesman, in his day one of the most prominent of British representatives in South Africa, was born in Hertfordshire, England. After studying at the grammar schools of his native city, his ill health caused his family to send him to Natal, South Africa. From there he went to the then recently discovered Kimberly diamond field, and in two years he acquired a considerable fortune. The return of health permitted Mr. Rhodes to acquire a long coveted university education. He sailed for England, enrolled at Oxford and was graduated in 1881. He did not neglect his business interests, however. A combination of almost all the independent mining companies of Kimberly under the title of the De Beers Consolidated Mines was effected by him. Convinced of the virtues of the British imperial system, Mr. Rhodes resolved to extend and strengthen Britain's influence in South Africa. In 1881 he was elected to the Cape assembly. In this body he worked incessantly for amicable relations between the English and the Dutch in the Colony. Due to his efforts, England annexed Bechuanaland in 1884, and secured possession of Rhodesia in 1888. The British South Africa Company was put in charge of the latter territory, with Mr. Rhodes as the dominant figure. In 1890 he was chosen Premier of Cape Colony. He planned and promoted the Cape-to-Cairo Railroad. As was inevitable, Mr. Rhodes came into conflict with the Boer Republic of the Transvaal, and was thus largely responsible for the Jameson Raid of 1895. This incident was the cause of his resigning as Premier. When the South African War opened, he was at Kimberly, and assisted in the defense of the city, but before peace was restored, he died. Though many of his acts have been criticized, it is generally held that Mr. Rhodes in working for English dominance, was prompted by the belief that English world empire would be very beneficial not only to England, but to all the world. In his will, Mr. Rhodes left his fortune for the purpose of educating Anglo-Saxon youth to the idea of empire. His most notable bequest was that to Oriel College, Oxford,

for scholarships. See RHODES SCHOLARSHIPS.

Rhodes, rōdz, an island of the Aegean Sea. It lies about ten miles distant from the southeast coast of Asia Minor. Historically, the island belonged to one or the other of the cities of Greece, but it is now a Turkish possession. Rhodes has always been famous for a fine, mild climate, a fertile soil, and a great variety of the finest fruits, vegetables, and other products. At the present time, exports of olives, figs, pomegranates, sponges, and olive oil amount to about $1,000,000 a year. The present population is about 30,000. Two-thirds are Greeks, the rest are Turks and Jews. The city of Rhodes at the northeastern extremity of the island is noted in history. The island was held by Athens, Sparta, and Alexander successively. It passed with Asia Minor under Roman rule. It was taken by the Arabs in 661. During the Crusades the city was occupied by the Knights of St. John who converted it into a strongly fortified post. The island was the site of a colossal statue, which was one of the seven wonders of the world. See COLOSSUS.

Rhodesia, an inland British colony of South Africa, has an area of about 440 square miles and is bounded by Belgian Congo and Tanganyika Territory, north; Portuguese East Africa, east; the Transvaal, south; and Angola, west; the Zambezi River divides the colony into Northern and Southern Rhodesia. The total population is estimated at 1,728,000, of whom about 40,000 are white. The entire colony is administered by the British South Africa Company.

NORTHERN RHODESIA. This part of the colony is a high, thinly forested plateau that contains thousands of acres of land suitable for farming and grazing. The principal agricultural products are cotton, tobacco, corn, wheat and fruit (chiefly European). Rubber and timber are abundant, and coal, lead, zinc and copper are mined. The Zambezi, Kafue, Chambesi and other rivers are navigable.

The important towns of Northern Rhodesia are Livingstone, on the Zambezi, the administrative headquarters; Broken Hill, Fort Jameson, Lealui, Abercorn and Fife.

SOUTHERN RHODESIA. All except about 3,000 of the white inhabitants of Rhodesia are in the southern half of the colony, and its economic conditions and cultural development are superior to those of Northern Rhodesia.

Southern Rhodesia is an important live stock raiser, and the agricultural produce includes tobacco, lemons, oranges, wheat, corn, Kafir-corn and cotton. This part of the colony is particularly rich in minerals, the chief products of the mines being gold, copper, coal, asbestos, arsenic, diamonds, silver, chrome ore, mica, wolframite and antimony.

In 1920 there were 77 public, 4 aided, 28 private and 696 native schools in Southern Rhodesia, and plans were drawn for further extending the educational system. A main railroad from Cape Colony to the Congo crosses Rhodesia, and there are several short lines, and at the end of 1920 the total length of lines within the colony was 2,468 miles. The principal towns are Salisbury, the administrative center, Gatooma, Umtali, Buluwayo, Hartley, Victoria, Gwelo and Salukwe.

Rhodes Scholarships. At his death, Cecil John Rhodes left a fortune to be used to establish scholarships at Oxford University, England. His directions were that these should be distributed as follows: Rhodesia, 9; Cape Colony, 12; Natal, 3; Australia, 18; New Zealand, 3; Canada, 6; New Foundland, 3; Bermuda, 3; Germany, 15; and 2 each for the states of the United States.

To be eligible for one of these scholarships the candidate must be young, and must be healthy and active physically and mentally. Only unmarried males are eligible. In the United States the specific requirements are: citizenship, and residence in the United States for five years; by October 1 of the year for which he is elected the candidate must have passed his nineteenth and must not have passed his twenty-fifth birthday; by October 1 of the year for which he is elected he must have completed his sophomore year at a recognized degree-granting college or university of the United States. Candidates must

first be selected by their own college or university, the method of selecting being optional with the institution. Institutions with less than 500 students may select not more than two candidates; those with from 500 to 1,000 students may choose not more than four candidates; and those having more than 2,000 may choose not more than five candidates. Force of character, qualities of leadership, literary and scholastic ability and attainments and physical vigor are essential to success in the final selection. But physical vigor will be treated as of minor importance if the applicant excels in other ways.

Holders of an approved university degree who have pursued a three years' course of study at that university can obtain senior standing at Oxford, securing exemption from all examinations prior to the final honor schools leading to a B. A. degree. Holders of technical degrees, graduates of schools not recognized by the Association of American Universities, or undergraduates who have taken no degrees are given junior standing. No candidate for an Oxford degree is required to show a knowledge of the Greek language and no restriction is placed upon the Rhodes scholar's choice of studies. He may read for the Oxford B. A., may enter for one of the diploma subjects, or if qualified by previous training, may be admitted to read for such advanced degrees as B. Sc., B. Litt., B. C. L., or Ph. D.

The scholarship carries with it a grant of $1,500 a year, and since the scholarship is tenable for three years, in one of each three years there will be no election. In each of the other two years one scholarship will be filled if a suitable candidate is to be found.

Rhododendron, rō-dō-dĕn′drŏn, an ornamental evergreen shrub of the heath family. There are over twenty species. They are native from Java to California. The species vary from two foot dwarfs to trees thirty-five feet in height. They are handsome lawn and house plants with heavy leaves and showy flowers of several colors. The American species go by several local names as azalea, pixie flower, great laurel, and rhodora.

Rhoecus, rē′kŭs, in Greek legend, a youth who once propped up an oak tree which he saw about to fall. The nymph or dryad of the tree was grateful for the respect thus shown her, and when Rhoecus sought her favor she was very gracious. She charged him, however, to keep faith with her, and that when she sent her messenger, the bee, to summon him he must at once obey. Rhoecus promised to do so. One day, however, the bee came when he was playing checkers, and in his absorption he brushed it hastily away. The dryad was offended, and blinded Rhoecus in consequence. Lowell has made this story the subject of a poem entitled *Rhoecus.*

Rhoecus, I am the Dryad of this tree
And with it I am doomed to live and die.
The rain and sunshine are my caterers,
Nor have I other bliss than simple life,
Now ask me what thou wilt, that I can give
And with a thankful joy, it shall be thine. . . .

Oh, Rhoecus! nevermore
Shalt thou behold me or by day or night,
'Tis thou art blind,
Not I unmerciful, I can forgive,
But have no skill to heal the spirit eyes.

Rhone, rōn, a river of central Europe. It rises in the famous Rhone glacier in the Swiss canton of Valais. Its general direction is westward into France, where it takes a turn to the southward and falls into the Gulf of Lyons. Where its cold waters issue from the enormous mass of the glacier, it may be crossed easily by stepping stones. The waters of the upper river are roily, but before leaving Switzerland it passes through Lake Geneva. Its silt is deposited in the upper end of that lake, and its blue waters leave the lake at its western extremity with the swiftness of an arrow. A mile or two to the westward of the Geneva, the Rhone receives the Arve, swollen by the waters of the valley of Chamonix and the glaciers of Mt. Blanc. At one place above its junction with the Saone, its principal tributary, the Rhone passes through a chasm so narrow that the overhanging rocks almost touch each other. It is said that at one point one may stand with a foot on either bank "and see between the beautiful river trembling as it were with rage, and hastening to escape from the defile through which it is doomed to pass." The waters have, of course, cut a wide passage underneath.

Lyons, the center of the French silk industry, is the largest city on its banks. The

lower or navigable portion of the river is connected with the Rhine and the Loire and Paris by a remarkable system of canals. The Rhone and the Rhine were for ages the great highway between southern and northern Europe. Speaking in his lines *To the Rhone* of its issuance from the glacier and its lordly course through France, Longfellow says:

Forth, like a steel-clad horseman from a tower,
With clang and clink of harness dost thou go
To meet thy vassal torrents, that below
Rush to receive thee and obey thy power.
And now thou movest in triumphal march,
A king among the rivers! On thy way
A hundred towns await and welcome thee;
Bridges uplift for thee the stately arch,
Vineyards encircle thee with garlands gay,
And fleets attend thy progress to the sea!
—Longfellow.

Rhubarb, ru'bärb, a heavy-leafed relative of the dock, sheep sorrel, buckwheat, and smartweed. The similarity may be noticed in juice and seed. Common rhubarb is thought to be a native of southern Siberia. The clustered root-stocks are dried for the druggist; the leaf-stalks are the famous "pieplant" of American markets. There is very little sentiment connected with pieplant, but it is a substantial addition nevertheless to the kitchen garden. Gardeners vie with each other in producing mammoth tender stems by banking the growing plant.

Rhus. See POISON IVY.

Rhyme. See POETRY.

Rhythm. See POETRY.

Rialto. See VENICE.

Ribbon, a narrow web of silk, satin, or velvet, finished on each edge with a cord or other fancy selvedge. A ribbon may be from three-sixteenths of an inch to eight or nine inches in width, although sash ribbons are often made much wider. Ribbons are made in endless variety. The weave may be plain, gros-grain, or figured. Different materials, as silk and velvet, may be combined in stripes or fancy designs. One color may be used or many colors combined in stripes, plaids, or figured effects. In their manufacture, a number of ribbons, even as high as forty, are woven side by side on the same loom. Factories fitted up for the manufacture of "rainbows" do no other weaving. The great ribbon-manufacturing center of the world is the silk-producing region of the Rhone. St. Etienne, France, is the greatest local center of the industry. There are 40,000 ribbon weavers in the city and vicinity. Lyons, a few miles farther up the Rhone; Basel, on the Rhine; Crefeld, Germany; Vienna, Austria; and Coventry, England, as well as Leicester and Norwich, are centers of the ribbon industry. Ribbon weaving was established at St. Etienne in the eleventh century. Ribbons used in the United States are mostly of domestic production. Paterson, New Jersey, is the center of the industry, although there are other flourishing factories in New Jersey and in New York.

The numbering of ribbons is an interesting feature of their preparation for market. The system in use arose in England and is in some way connected with English pence. It is supposed by some that the narrowest, No. 1, was sold originally for one penny, No. 2, for two pence, and so on. Perkins, in his *Treatise on Haberdashery,* says that No. 1 was the width of the old English penny edgewise, No. 2, the width of two pence, No. 3 of three pence, etc. The width in inches of the various numbers of ribbons in common use is as follows: No. 1, $\frac{3}{16}$-inch; No. 1½, $\frac{5}{16}$; No. 2, $\frac{7}{16}$; No. 3, $\frac{9}{16}$; No. 4, $\frac{11}{16}$; No. 5, $\frac{15}{16}$; No. 7, $1\frac{1}{8}$; No. 9, $1\frac{1}{2}$ to $1\frac{5}{8}$; No. 12, $1\frac{7}{8}$ to 2; No. 16, $2\frac{3}{8}$; No. 22, $2\frac{5}{8}$ inches.

Ribbon Fishes, a family of deep water fishes. They have long, narrow, tape-like bodies several feet in length, a few inches high, and about one inch in width. The back fin runs the entire length of the body. The mouth is small. Despite their shape, they are allied to the mackerels. They are found in deep sea water all over the world, but are so delicate and fragile that it is difficult to obtain a perfect specimen. Not infrequently their mutilated bodies are thrown ashore after storms.

Ricardo, re-kar'do, **David** (1772 1823), a celebrated political economist. He was a native of London. He belonged to an honorable family of Jewish bankers and received a commercial education. He alienated his parents by joining the Church of England and marrying a Protestant. His character and knowledge of the banking business, enabled him to amass a moderate fortune by the time he reached the age of twenty-five. He then abandoned the busi-

ness and betook himself to the study of political and financial questions. He studied the works of Adam Smith and made the acquaintance of James Mill, the father of John Stuart Mill. He was a member of a circle of thinkers and writers who studied social and political questions. He contributed to the periodicals of the day, and wrote also a number of works of a serious nature. He is best known by his chief work, *The Principles of Political Economy and Taxation,* which appeared in 1817. At the present time the name of Ricardo is still prominent in the history of political economy. In 1819 he entered Parliament, in which body he became a distinguished advocate of free trade. His fundamental doctrine is the theory that selling price is determined ultimately by the cost of production.

Rice, Alice Caldwell Hegan (1870-), an American novelist whose *Mrs. Wiggs of the Cabbage Patch* won her instant recognition, and has delighted a vast public since its publication in 1901. She was born at Shelbyville, Ky., and was educated privately. She wrote a few stories before the appearance of the novel mentioned, but attracted little attention. The charm of *Mrs. Wiggs of the Cabbage Patch,* which ran through more than forty editions and has been translated into several foreign languages, lies in its humanness, its homely humor, and its unbounded optimism. In 1902 the author was married to the poet, Cale Young Rice. Other books by Mrs. Rice are *Lovey Mary, Sandy, Mr. Opp, The Romance of Billy Goat Hill, Calvary Alley, Quin* and *Miss Mink's Soldier, and Other Stories.*

Rice, one of the important cereals. Like several other food plants, rice was originally a wild grass, native in the East Indies. It is now cultivated very generally in all quarters of the globe. It is the chief food of the people of China, Japan, and India. It is said that one-third of the human race lives on rice. More people are dependent on rice than on any other one food. Our first rice seed was brought from Madagascar in 1695. Rice culture was introduced into the Carolinas and Georgia about 1700. The delta lands of that portion of the Atlantic Coast are particularly adapted to its culture. Of late large areas in Louisiana and Texas have been found well adapted to rice raising. Rice requires a warm climate and abundance of moisture in the soil.

Two methods of culture are in vogue, that of the Carolinas and that of Texas. The Carolina rice fields are flooded by means of the rivers. The lower courses of the rivers are inclosed by huge mud dikes twenty feet broad at the base and perhaps ten feet high. The lands adjacent to these dikes are subdivided into fields by smaller embankments, and are provided thoroughly with ditches, sluices, and gates. When the tide is out, the planter is able to flood his fields from the river; when the tide is up, the salt water is shut off by gates. Salt water is excluded. It kills the rice plant. At certain times the fields require to be dry for purposes of cultivation, sowing, and reaping. They may be drained at low tide. At other times they are flooded in order to promote growth.

The Texas system is somewhat different. In the southwest, the rice fields lie above the water level and are irrigated by means of lifting pumps. Four hundred thousand acres of rice are watered in this way. The soil is more solid than in the Carolina rice fields, and the use of improved machinery is entirely practicable. The cultivation of rice in Texas and Louisiana is not unlike that of wheat on the northwestern prairies.

Rice was introduced into California a few years ago and that State, in 1920, ranked third among the rice producing states. The fields are irrigated by ditches.

The following tables give the latest figures of production for all rice growing states of the Union and for those countries for which statistics are available:

State	Bushels
South Carolina	175,000
Georgia	78.000
Florida	88,000
Alabama	20,000
Mississippi	20,000
Louisiana	1,560.000
Texas	5,596,000
Arkansas	6,688 000
California	5,880,000
United States	20,105,000

Country	Bushels
Korea	73 859 654
Japan	2,342,349,204

India	12,743,630,000
Italy	15,053,027
Guatemala	117,855
Bulgaria	112,668
Honduras	174,852
Java	1,470,510,700
Indo-China	142,803,630

When rice comes from the thrashers it has a hull similar to that on oats or barley and is known as a paddy. This hull is removed by "milling," which consists in passing the grain through a mill constructed expressly to remove the hulls. The rice is then polished, graded according to size and placed in sacks, ready for the market. Unpolished rice is less expensive but more nutritious than the polished.

Rice Paper, a thin, strong paper used largely in China and Japan. It is now made, however, chiefly in Formosa, from the pith of a small tree. This pith may be extracted in the form of pure white cylinders two inches in diameter and several inches in length. The paper is made by paring the pith into a long, delicate ribbon by means of a razor-like edge, so set that it slices off a thin shaving of uniform thickness. The ribbon is then straightened out, subjected to pressure, dried, and, if desired, cut into sheets. It resembles the paper made from the Egyptian papyrus, and is used in making artificial flowers, light hats, and sunshades. See PAPER; PAPYRUS.

Richard I (1157-1199), king of England. He was the son of Henry II and Eleanor of Aquitaine. He was crowned king at Westminster in 1189, but he spent a small part of his life in England. Much of his time was spent in France, where he had extensive possessions. As soon as he became king of England he raised money by all practicable means and led the Crusade against Saladin, with whom he finally concluded a truce. He met his death from an arrow wound received while storming the castle of a rebellious vassal in France. This is the king known as Richard the Lion Hearted. He is the Richard of Sir Walter Scott's *Ivanhoe* and *The Talisman;* also of Hewlett's *Richard Yea-and-Nay.* For an account of his imprisonment, see article on BLONDEL.

Richard II (1367-1399), king of England, son of the Black Prince. He was not a strong prince. His reign was marked by quarrels with his relatives and with circles of the nobility. The insurrection of Wat Tyler occurred during his reign. He was a patron of the poet Chaucer and protected Wyclif in his preaching and writing. He is the leading character in Shakespeare's drama of *Richard II.*

Richard III (1452-1485), king of England. He aided his brother Edward IV against the Lancastrians. At Edward's death he became protector of the kingdom and guardian of his two nephews, Edward V and Richard, Duke of York. He has always been held responsible for their murder. On their death he ascended the throne as Richard III. In 1485 Henry Tudor, a descendant of John of Gaunt, landed in England and defeated and killed Richard in the Battle of Bosworth Field, thus bringing to an end the Wars of the Roses. He is the central character in Shakespeare's tragedy of *Richard III.* There is no historical foundation for the Shakespearean representation of Richard as a hunchback.

> Scarce half made up,
> And that so lamely and unfashionable
> That dogs bark at me as I halt by them.

A view of Richard as a fighter is given by Stevenson in *Black Arrow.*

SEE WARS OF THE ROSES.

Richardson, Samuel, an English novelist. He belongs to the same period as Addison, Pope, Steele, and Swift. He had a gentle, feminine spirit, and early showed a skill and an ease in expression which led to his being employed as a letter writer by some young ladies of the neighborhood. This began when he was only thirteen years of age. So well did he please these young women with his letters, and so carefully did he guard their little secrets, that they kept him writing frequently for a couple of years. At the age of fifteen he went up to London and learned the printer's trade, which he followed during the rest of his life. When about fifty years old, some publishers asked him to prepare a letter writer which would be useful to persons not used to expressing themselves through the medium of pen and paper. While engaged in this work, it occurred to him that he might

LOUIS XIII AND RICHELIEU
From the Painting by V. Brozik

make these letters tell a connected story. *Pamela,* the first modern English novel, was the result. It is in four volumes, and is intended to show that virtue brings its own reward. Richardson's other novels are also in the form of letters. They are of great interest to the student of literature, but are too tedious for the general reader. *Clarissa Harlowe* drags through eight volumes.

Richelieu, rēsh'eh-leo (1585-1642), a French cardinal and statesman of the seventeenth century. He was a native of Paris. He belonged to a noble but impoverished family, and was educated for the military profession. A brother that was a bishop having retired to a monastery, Richelieu studied theology and obtained an appointment as his successor. Having attracted the attention of Mary de Medici, the mother of the young King Louis XIII, he obtained standing at court. In 1622 he was made a cardinal, and two years later he was appointed minister of state. Although at times Louis XIII and the court party tried to get rid of Richelieu, he remained in power practically throughout the entire reign of his royal master, whom, indeed, he survived a few months. He shaped the history of France for a quarter of a century. His state policy may be described in brief as covering two points: the making of the French monarch supreme at home, and humbling his chief rival, the German emperor, abroad.

In pursuance of this policy, he crushed the great nobles of France with a merciless hand and waged unrelenting warfare against the Huguenots until he had captured La Rochelle and the other garrisoned towns which they held. Although he was a Catholic, his enmity for the Huguenots was political, rather than religious. He believed that the possession of fortified towns by a factious element was contrary to the interests of the general government. In foreign affairs, he struck hands with Gustavus Adolphus and the Protestant princes of northern Europe against the Catholic emperors and princes of southern Germany. Portugal became independent of Spain through his assistance.

See MAZARIN; LOUIS XIII.

Richelieu River (also called Chambly, St. John, and Sorel, River), is the outlet of Lake Champlain into the St. Lawrence River. It has a length of 80 miles, and after leaving the lake flows almost due north, entering the St. Lawrence by way of a widening of that river known as Lake St. Peter. The point of contact with the latter is at Sorel, about half way between Three Rivers and Montreal. The Richelieu is from 0.21 to 1.5 miles wide, and is navigable from Sorel to Chambly, and from Chambly to St. John a canal has been built, providing for continuous navigation to the latter city.

Richmond, Ind., a manufacturing city and the county seat of Wayne County, is on the Whitewater River, on the National Road, and on three railroads, 68 miles east of Indianapolis, It is the commercial center for almost all of Wayne County, a fertile agricultural region. It has also important industries, including the making of traction engines, threshing machines, grain drills, lawn mowers, plows, milling machinery, boilers, flour, caskets, clothing, wire fence and kitchen cabinets. It is the seat of Earlham College and St. Mary's Academy, and has a business college, the Morrison-Reeves Library and the Richmond Law Library. The Eastern Indiana Hospital for the Insane is here, together with homes for aged women and for orphans. In 1920 the population was 26,728.

Richmond, the capital of Virginia. It is situated at the head of navigation on the James River, about ninety miles from the Chesapeake. In his *American Notes* Dickens speaks of Richmond as "delightfully situated on eight hills overhanging the James River, a sparkling stream studded here and there with bright islands, or brawling over broken rocks." The city is an important center of tobacco curing and manufacturing. The value of the output of plug tobacco, cigarettes, cigars, and smoking tobacco exceeds $10,000,000 a year.

Historic interest centers in Capitol Square, a beautiful park of twelve acres, in the center of which the classical state capitol stands. The building is of two stories and is oblong in shape. At the suggestion of Thomas Jefferson it was modeled after an ancient Roman temple at Nimes, France. Modern wings were added in 1905. A por-

tion of the square was formerly part of a plantation owned by Nathaniel Bacon. The grounds are studded with fine trees, the home of large gray squirrels, so tame that they hardly scamper out of the pathways. There are numerous statues of public men, including Washington, Jefferson, Patrick Henry, Chief Justice Marshall, Clay, and "Stonewall" Jackson. The governor's mansion and the state library face the square. The latter guards the original parole signed by Cornwallis at Yorktown and many other historic documents. The church in which the famous Virginia Convention of 1775 met still stands. The attendant still points out the pew in which Patrick Henry sat and the spot where he stood when he made his celebrated speech ending, "I know not what course others may take, but as for me, give me liberty or give me death." The prevailing architecture of the city is what is known as colonial. Large porticoes and lofty pillars give dignity to the old homes. The houses of Justice Marshall and other historic residences still stand. Presidents Tyler and Monroe are buried in Hollywood Cemetery.

Captain John Smith was the first white man to visit the site of the city. The capital of Virginia was moved from Williamsburg to Richmond in 1779. In June, 1861, it became the capital of the Confederacy. The city was fortified by a circle of distant earthworks which may yet be traced from the roof of the capitol. It withstood the attack of the Federal troops for three years. Nearly two score battles and skirmishes took place in the immediate vicinity. Many of the Federal prisoners were confined in Libby Prison, an old tobacco warehouse, and on Belle Isle in the James River. The home, official quarters, church pew, and burial place of Jefferson Davis are here.

Over 6,000 unknown Federal dead lie buried in the National Cemetery. Hollywood is the resting place of 12,000 Confederate dead. Their memory is commemorated by a magnificent pyramid of granite, adorned with ivy and Virginia creeper. The home of General Robert E. Lee, the hero of the Confederacy, is owned by the Virginia Historical Society. His statue and that of his well known war horse, "Traveler," grace Howitzer Park.

Richmond has been the meeting place of many noted gatherings and the scene of stirring events. Although an active manufacturing and commercial city, the historic part of the town remains practically unchanged. The chain of historic associations is still unbroken. A new city hall, a highly ornate modern building seems almost out of place. Population, 1920, 171,667.

See VIRGINIA; LIBBY PRISON; CONFEDERACY.

Richter, Jean Paul Friedrich (1763-1825), a German humorist, satirist, philosopher, and poet. He is known commonly by the name of Jean Paul, which he used as a pseudonym. He was born at Wunsiedel, Bavaria. He attended the gymnasium and went to Leipsic to complete his education at the university. His father's death left the family in extreme poverty, against which the young Jean Paul struggled desperately for years, finally obtaining recognition as one of the most gifted men of his time. His writings fill over sixty volumes, including philosophy, poetry, and novels. They are a strange union of the noble with the grotesque, and are little read outside of Germany. His novels are better known than any of his other works. Of these *Hesperus* and *Titan* are the most famous. Richter was much admired by both Carlyle and De Quincey. His writings are characterized by such striking singularity that his countrymen have given him the name of *Der Einzige,* The Unique.

Richter had poetic genius of the first order, but no power of combining particulars to a harmonious whole. At the slightest hint his fancy is led to new series of thoughts. Like a cheerful, lively child sent out on an errand, he was diverted by all he found in his way, by meadow and wood; now chasing a butterfly, now picking berries, now listening to the birds, forgetting his special work. He mistook his genius in attempting connected works; in the idyl he would have been a master. He had the deepest sympathy with the poor, and it is unfortunate that one who so labored to comfort the wretched did not write so that they could understand him; even for Germans, there is a special dictionary for Jean Paul. Yet he abounds in richness of wit, splendor of expression, graphic power, beauty of rhythmic movement.—Hosmer.

Rickets, or **Rachitis,** a chronic disease of infancy and childhood due to faulty nutrition, and therefore often found among bottle-fed babies. It is especially common

in children reared on proprietary foods. Lack of cleanliness, exercise, fresh air and sunshine is also conducive to this disease and adds to its severity.

The most striking feature of rickets is its effect upon the bones which become soft and flexible so that they are easily distorted in shape. In very severe cases nearly every bone in the body becomes affected. Rickets is not in itself a fatal disease but a child afflicted with this ailment is far more susceptible to other diseases, so that it is regarded as an important factor in the mortality of children under two years of age.

Proper treatment in the early stages of rickets may prevent any unfortunate results. The first symptoms are restlessness, and sweating of the head, especially at night, followed by constipation, enlargement of the abdomen, and of the wrist and ankle bones. Hygienic surroundings and proper feeding are the cures. Starchy foods should be reduced to a minimum. Nitrogenous foods and fats, as milk, cream, eggs, red meat and fresh fruits are recommended. If the patient is too young for solid food, cow's milk should be given in preference to condensed milk or patent foods. Orange juice is especially efficacious, its free use often effecting a cure without medicine.

Riddle, or **Enigma,** an obscure saying in which a hidden meaning is proposed for discovery. The famous riddle proposed by the Grecian Sphinx to Oedipus will bear repetition:

What animal is that which in the morning goes on four feet, at noon on two, and in the evening upon three?

Oedipus made reply,

Man, who in childhood goes on hands and knees, in manhood walks erect, and in old age with the aid of a staff.

Samson, who, it may be remembered, had found a swarm of bees housed within the ribs of a dead lion proposed the following riddle to the Philistines:

Out of the eater came forth meat, and out of the strong came forth sweetness.

What we caught we threw away, and what we could not catch, we kept,

is said to be a popular riddle among the fishermen of France. The following, referring to a candle and a well respectively, are popular nursery riddles:

Little Nancy Etticoat, with a white petticoat and a red nose,
The longer she stands, the shorter she grows.

Round as a saucer and deep as a cup,
All the horses of King George can't pull it up.

In the seventeenth century the riddle was a favorite form of literary and social diversion. The collected riddles of France, Germany, and England form a small library. Of late the riddle seems to have degenerated into the conundrum and the pun. See PUZZLE; CONUNDRUM; CHARADE.

Rideau Canal, a Canadian waterway connecting Ottawa on the Ottawa River with Kingston on Lake Ontario. It forms a part of a canal system in a water route from Kingston to Montreal by way of the Ottawa River. The canal was completed in 1832. It is 120 miles long and has a navigable depth of four and one-half feet and there are fifty-seven locks each 134 feet long and 33 feet wide. When constructed the Rideau Canal was of military importance. However, it is now used entirely for carrying freight and has an annual traffic of about 150,000 tons. See CANAL.

Riel, Louis (1844-1885), a Canadian quarter-breed agitator and the leader of two rebellions against the Canadian government, was born at Saint Boniface, Manitoba, and was said to have studied for the priesthood. Little is known of his youth; he worked in Minnesota at various occupations from 1866 to 1868, but in 1869 he sprang into prominence as the leader of the rebellious half-breeds (métis) in the Red River Valley. See RED RIVER REBELLION). Though Riel was the dominant figure of the rebellion of 1869 he only acted as secretary of the provisional government, leaving the presidency to one John Bruce. Riel escaped to the United States in 1869, when troops were sent to oppose him and his followers. He returned, however and in 1873, and again in 1874 he was elected to the Dominion House of Commons for Provencher. He had the hardihood to attempt to take his seat in the latter year, notwithstanding the reward of $5,000 then standing for his apprehension. He was expelled and outlawed in 1875.

For some months in 1877 Riel was confined in an insane asylum in Quebec; but he was released, and little was heard of him until nine years later. During the interval he lived for five years in Montana, leaving only when the half-breeds who had left the Red River Valley for the Saskatchewan River called him. These people were again ready to make demands upon the Dominion government, and looked to their old leader for assistance. In 1885 he was elected president of the provisional government, with headquarters at Saint Laurent. The provisional government was short lived; Riel was captured, tried and hanged; and the other rebels scattered.

Riel was an eloquent, brilliant, magnetic man, a man born to lead but doomed to failure because of the narrowness of his vision, and his instability. At the time of his trial Riel's counsel entered the plea of insanity, and many of Riel's sayings and acts at this time seemed to indicate a basis in fact for the plea. See SASKATCHEWAN REBELLION.

Rienzi, re-en'zee (1313-1354), an Italian patriot. His father was a tavern keeper, his mother a washerwoman. The assassination of his brother by a Roman noble, and the impossibility of bringing the murderer to punishment, is said to have fired Rienzi with the ambition of rescuing Rome from the misgovernment and tyranny of a dissolute nobility. He appears in some way to have received a liberal education, including grammar, rhetoric, and the classic poets. He made himself the advocate of orphans, widows, and the poor. The pope at this time resided at Avignon, France. Rienzi went thither in hope of receiving his assistance, or at least countenance, in renovating Rome. Here he formed a close friendship with the poet Petrarch. On his return to Rome, he succeeded in instituting a popular revolution. He surrounded himself with a bodyguard and drove the nobles from power. The people clothed him with the powers of a dictator. The favor of the populace is proverbially fickle. Although a man of integrity and an ardent advocate of popular liberty, there is no doubt that he became arbitrary and permitted himself to be surrounded with too much pomp and circumstance. A congress of 200 delegates assembled by him from all parts of Italy created alarm. The pope withdrew his moral support. Rienzi was driven from Rome after a tenure of power lasting only seven months. Three years later he endeavored to interest the powers of Europe in the affairs of Rome. He was summoned to Avignon and condemned to death by a papal court of inquiry. His life was spared at the entreaty of Petrarch. In the meantime, disorder at Rome became worse. Rienzi was sent with a representative of the pope to restore order. He entered Rome in a triumphal procession and was again received with acclamation by the populace. Again, as before, the nobles defied his government and shut themselves up in their castles. The people grumbled at the necessity for taxation. Rienzi became suspicious and severe. In two short months a riot broke out, a crowd drew him from the capitol, put him to death with indignity, and dragged his body through the streets. Bulwer-Lytton has followed the facts of his life with historical accuracy in his *Rienzi, the Last of the Tribunes.*

Rifle, a hand gun having a heavy barrel, the inside of which is channeled by spiral grooves. The rifle is a later invention than the musket. It is credited to Leipsic in 1498. The superiority lies in the spiral grooves. They give a bullet a rotary motion that carries it truer to the mark. The first rifles made in this country were manufactured in Pennsylvania about 1732. The bullet was expected to fit so closely that it had to be driven in upon the charge of powder with great force. Later the bullet was made a little smaller and was wrapped in a greased patch to make it fit closer without the expenditure of so much force upon the ramrod. The Chassepot and Martini were favorite European rifles fifty years ago, but they have been replaced by the Mauser, the Lebel, the Lee-Mitford, and the Krag-Jörgensen. All modern armies are now supplied with rifles. The infantry of the United States have been armed, for instance, with Springfield rifles, the bullets of which weigh 500 grains. These are being replaced, however, by the Krag-Jörgensen with a magazine holding five cartridges. The United States marines carry Lee-Remingtons. The Lee-Remingtons, the Sharps,

and the Winchester are well known American rifles.

Telescopic sights have been in use for some time. Smokeless powder is one of the later inventions. Muzzle-loading guns have gone out of use altogether. The modern breechloader which permitted the insertion of a cartridge at the base of the barrel was a great invention, but it has been replaced by the repeater or chambered rifle. It is provided with a long tube or magazine which runs along the under side of the barrel and contains a supply of cartridges. One jerk of a lever throws out the discharged cartridge. Another jerk puts a fresh cartridge in its place, and the gun is ready to be fired.

The spiral grooving of different rifles is of a variety of shapes in cross-section. The number of grooves is also different for different rifles, as is the pitch of the spiral—that is, the distance, measured on the exis of the bore, included by a single turn of the spiral. The variation in small-arms in this respect is wide—from one turn in 17 inches to one turn in 7 feet. The tendency in modern rifles is toward smaller bores and chambers. Exclusive of repeating rifles or magazine-guns, the principal differences between modern rifles are in their breech-actions and their firing mechanisms.

Whatever may be the form of cross-section in the grooves of a rifle, the modern practice is to make them, for small-arms, extremely shallow; and though the grooves are usually of rectangular form, with sharp angles, the angles are commonly rounded, this being an easier form to keep clean. Henry's system of rifling, long used in military rifles, has seven grooves, and the grooves make one turn in 22 inches. The grooves are broad, rectangular, and very shallow, with rounded angles, the "lands" being much narrower than the grooves. This was the system used in the famous Martini-Henry rifle, with which the British army was formerly equipped.

A system much in vogue for match rifles in America includes a uniform spiral, making one turn in 18 inches, with very shallow grooves. Hardened bullets are required with such grooves; and the method of shallow grooving, with hardened bullets, in recent years has taken the place of deep grooves and soft bullets, which were characteristic of earlier systems.

While the term "rifle" is usually associated with the idea of a small-arm with rifled bore, it is applied by military men also to pieces of ordnance, or artillery, having a barrel or barrels with a spirally grooved bore. The system of rifling used for such large-bore guns is the Whitworth system or some development of it, having a hexagonal bore with spiral faces. The projectiles for such rifles are also hexagonal, with twisted sides. Another system of rifling for ordnance consists of three spiral grooves of deep elliptical cross-section, into which fit three wings on the front of the shot or shell. Other systems of grooves are also used for rifled ordnance.

Rift Valley, a condition of the earth's crust which causes the vertical strata to become displaced. In the beginning, these vacancies are occupied by bodies of water, but after a while their sharp lines disappear, and they become dry. There are many such depressions now existing.

Riga, re-ga, the capital and chief city of Latvia is situated on the Dwina River, a few miles above its entrance to the Gulf of Riga. It is the chief seaport of the Baltic provinces. A system of canals, several lines of railway, and water access to the Baltic render the city of Riga favorable to commerce. The chief exports are wheat, oats, flax, hemp, and timber. There are manufactures of machinery, tobacco, and woolen goods. Riga was founded in 1201. It was for a time one of the most flourishing cities of the Hanseatic League. During the wars pending the settlement of the boundaries of northern Europe Riga changed masters repeatedly; it passed under the dominion of Poland in 1581; of Gustavus Adolphus in 1621; and, finally, into the hands of the Russians in 1710. Few old buildings of interest remain. The cathedral is noted for an organ of 6,826 pipes, dating from 1883. The pumping of the air is managed by a four-horse gas engine. It is said to be the largest organ in the world. The population of the city in 1920 was 185,137, while the city was under Russian

rule the dominant element was German. An aristocratic suburb lying outside of St. Petersburg gate is inhabited by wealthy German merchants.

Riggs, Mrs. Kate Douglas Wiggin (1857-), an American author. Her maiden name was Kate Douglas Smith. She was born in Philadelphia and received her education at Abbot Academy, Andover, Massachusetts. She early showed strong sympathy with children. It was through her efforts that free kindergartens for the poor were established on the Pacific Coast. In 1880 she was married to A. B. Wiggin, a lawyer (died 1889), and moved to New York. Much of her writing has been either for or about children. Her reputation as a writer was won by *The Birds' Christmas Carol,* a story of mingled humor and pathos. Other stories are *Timothy's Quest, The Story of Patsy, Polly Oliver's Problem, Penelope's Progress,* and *Rebecca of Sunnybrook Farm.* In collaboration with her sister, Nora Smith, she has written *The Story Hour,* a collection of short stories, and *Golden Numbers,* a collection of poems for children. In 1895 Mrs. Wiggin married George C. Riggs, but she still writes under the name of Kate Douglas Wiggin.

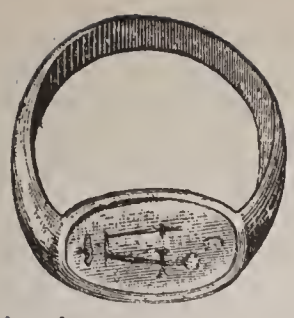
Right of Way, the right to pass over territory not one's own. A right of way is public when enjoyed by everybody; private when restricted to the use of a limited class of people. The term highway is applied to a public right of way, such as a path or by-road, but a regular public road is generally not designated. After a highway has been used by the public for several years, it is assumed that the owner has granted thereon full right of way.

Rigi, rē′gē, a mountain of Switzerland. It rises from the northwest shore of Lake Lucerne, a few miles from the Swiss city of that name. The summit commands a magnificent view of lake and mountain. Lake Zug lies on the north. Lake Lucerne, with its numerous arms, stretches away in the opposite direction. Tell's Chapel stands on the Lucerne shore at the south of the mountain below. The St. Gothard, Pilatus, the Jungfrau, and the snowcapped peaks of Uri and the Bernese Alps may be seen for a distance of 120 miles. The Rigi may be ascended by a few hours' climb or by either of two inclined railways. There are mammoth hotels at the top. During the tourist season they are thronged by people from all parts of the world. A veritable babel of languages is heard. In his *Innocents Abroad* Mark Twain gives a humorous and, of course, exaggerated account of his experience in watching for sunrise on the Rigi.

Rig-Veda. See SANSKRIT.

Riis, rēs, Jacob Augustus (1849-1914), an American author and social reformer. He was born in Denmark, but came to the United States in 1869. He worked at several trades and finally became a reporter on the New York *Sun.* He has done much as a lecturer and writer to arouse interest in conditions in the slums of New York. His works include *How the Other Half Lives, The Children of the Poor, The Making of an American, Nibsy's Christmas, and Children of the Tenements.*

Riley, James Whitcomb (1855-1916), an American poet. He was born in Greenfield, Indiana. When a young boy he learned sign painting and, after following that pursuit for a time, joined a company of strolling players, taking the part of an actor, composing songs, or arranging plays, as need required. He secured later a position on the editorial staff of the *Indianapolis Journal.* When about twenty years old, he began publishing poems in the Indiana papers. These were popular at once. From his use of the Indiana dialect he soon won the name of *The Hoosier Poet,* by which he is still known. Dialect poetry was Riley's special field, but his work was not confined to this. He wrote melodious and beautiful lyrics in literary English. His public readings of his own poems were very popular. The personality of the man and his sympathetic voice made his rendering of such poems as *Out to Old Aunt Mary's* and *Good Bye, Jim* unusually effective. Riley's chief books are *Afterwhiles, Poems Here at Home, Armazindy, Rubaiyat of Doc Sifers, Pipes o' Pan at Zekesbury,* and *Rhymes of Childhood.* Among his poems, *The Raggedy Man, Griggsby's Station, Nothin' to Say, The Old Band, Little Orphant Annie* are universal favorites, known and quoted by everybody. Riley has been called locally "The American Burns."



Ancient Egyptian

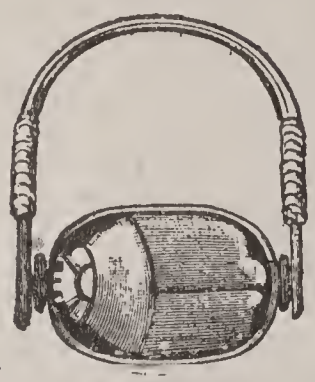
Gold ring of an Ethiopian queen.

Ancient Egyptian

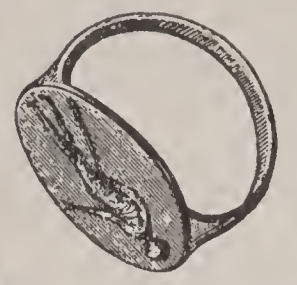
Grecian bronze ring.

Gold ring, Mycenae.

Roman gold ring. Sardonyx setting.



Egyptian signet ring

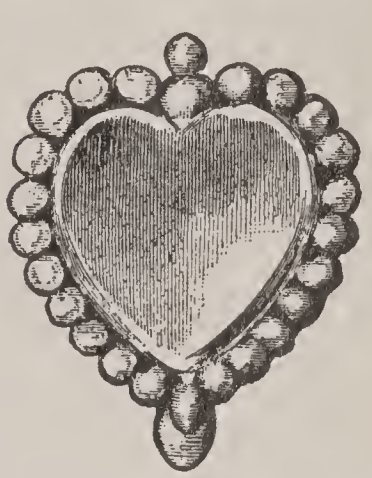


Grecian gold rings.

13.

Roman gilded bronze ring.

12.



East Indian bronze finger mirror

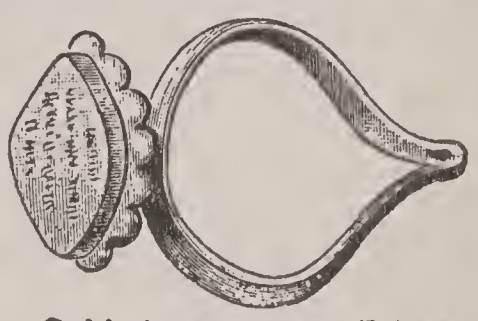
14.

15.

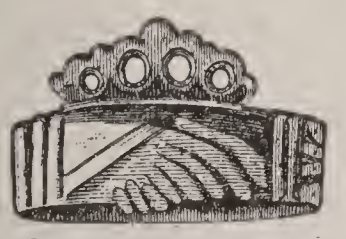
13—15. Etruscan rings.

12a.

Roman ring with cameo



Gold signet of a Brahman



Anglo-Saxon betrothal ring.

English amulet—15th century.

Ring of the Scotch Darnley.

Ring of Frederick the Great.

Wedding rings of Luther and Catherine.

Ring of Charles I of England.

RINGS.

Rinderpest, or **Cattle Plague,** an infectious disease affecting ruminant animals. It is attended by high fever, derangement of the digestive organs, ulceration of the mucous membrane, and general organic weakness. No effective remedy has been discovered, though inoculation with a serum has proved to be a successful preventative. Due to the highly contagious nature of the disease, all infected or diseased animals should be killed, and anything with which the aminal has come in contact should be properly disinfected. Rinderpest has been carried from one country to another through infected hides or food, when extreme precaution has not been taken. It was first known in central Asia and in Eastern Russia, and spread through Europe to Egypt, where its ravages caused heavy losses between the years 1889 and 1899. The disease is unknown in North America.

Rinehart, Mary Roberts (1876-), a popular American novelist and playwright, born at Pittsburgh, Pa. She was educated in the grade and high schools of Pittsburgh and at the Pittsburgh Training School for Nurses. In 1896, she was married to Dr. S. M. Rinehart. Her stories began to appear about 1908. Her first novels contained a large element of mystery, and were at the same time humorous and well plotted. Mrs. Rinehart's most notable early works are *The Circular Staircase, The Man in Lower Ten,* and *The Window at the White Cat.* Mrs. Rinehart has also written several successful plays, among them being *Cheer Up, Tish, Spanish Love,* and *The Bat.* Many magazines feature her short stories and travel articles. Her later novels are *When a Man Marries, The After House, Where There's a Will, A Poor Wise Man, The Breaking Point, The Street of Seven Stars,* and others. During the World War, Mrs. Rinehart served with the Red Cross in France.

Ring, in jewelry, a band worn, usually on the finger, as an ornament. The broad portion at the back of the finger is known among jewelers as the bezel; the rest as the hoop. Rings were worn by all the nations of which we read in ancient history. The oldest rings now in museums were found in the tombs of ancient Egypt. Those of the wealthy were massive bands of solid gold. Poorer people wore silver, bronze, glass, and even blue porcelain rings. A few Egyptian rings of amber, ivory, and carnelian have been found. The scarab, or sacred beetle, frequently took the place of the bezel. The Hebrews, Greeks, and Romans wore rings. A ring was a sign of social standing or authority. A device cut in the bezel was used to impress the wax wafer with which missives and documents were sealed. To show that full authority was given, a king entrusted his messenger with his signet ring. In lieu of a written appointment, a king gave his prime minister a signet ring.

The merchants of the Hanse towns adopted signet rings engraved with trademarks. The presentation of a merchant's ring was deemed proof that the messenger was duly authorized to make collections and give receipts. Rings were not always worn on the fingers. During the fifteenth and seventeenth centuries the pope was wont to send a newly appointed cardinal a ring to be worn on the thumb. They were impressive in appearance but of cheap material and inferior workmanship.

The museums in the old capitals of Europe possess fine collections of rings. The best workmanship appears to have been executed in Italy. Shakespeare's ring, a massive gold band with the initials W. S., is kept in the British museum. Among curiosities are rings the bezel of which contained poison. Hannibal is said to have carried in this way the poison with which he ended his life. The Venetian jewelers were skilled in making rings the bezel of which contained a poison set free by pressure on a light spring. In shaking hands with an enemy it was possible to scratch his hand slightly, while deadly poison followed.

The ring having no beginning and no end is a symbol of eternity. "With this ring, I thee wed," is a formula of the Church of England. According to good social usage, the engagement ring may be heavily jeweled, but the wedding ring should be a plain gold band. It should be placed on the fourth finger of the left hand, next the little finger, "Because, by the received Opinion of the Learned and Experienced in

Ripping up and Anatomizing Men's Bodies, there is a Vein of Blood which passeth from that fourth Finger unto the Heart called Vena amoris, Love's Vein."

Ringworm, a skin disease. It is caused by a minute parasitic plant which starts in small patches and spreads like a mold in every direction, thus forming rings. The name was given in a belief that the circles of inflammation were due to a minute worm burrowing in the skin. There are several kinds, all contagious and easily communicated. Although the disease is not dangerous, it is very annoying. One who is afflicted with it should have his own towel, sheets, and pillow cases. Like the itch, ringworm may be cured, usually by an application of mercurial ointment.

Rio de Janeiro, rē′ō dā zhä-nā′ē-rō, the capital of Brazil and second largest city of South America. It is situated on the western coast of the harbor of the same name. The latter is considered one of the most beautiful bodies of water in the world. It is entered by a narrow passage, but the bay expands immediately into a broad area comprising over fifty square miles. It is surrounded by rolling bluffs crowned with luxurious vegetation. The city itself was built on a low, ill-drained, flat, unsanitary tract, and was once a "mere chessboard of shabby, narrow streets." All this has been changed. The entire city has been provided with a sewerage system. There are numerous public squares adorned with tropical plants and cooled by stately fountains. Elevated suburbs on the surrounding heights afford delightful places of residence. Since 1750 water has been brought into the city by means of an imposing stone aqueduct resting on a double tier of arches. The water secured in this way is cool and of excellent quality. Among the buildings of note are the royal palace, the exchange, the postoffice, and the custom house. A fine municipal opera house, a national library, a school of fine arts, and other public buildings are arranged along a new central avenue. There are over fifty church buildings, built after what is known as the Jesuit style. A well kept botanic garden in one of the suburbs is a feature of interest. The citizens are fond of outdoor life. One street is given over entirely to cafés, bookstores, and the like, forming a general rendezvous. The city has manufactures of cotton cloth, furniture, and iron goods. The national arsenal is located here.

The railways center at the capital city. It has a foreign commerce of considerable importance. Over 2,000 ships, including coasting vessels, clear annually. "Rio" coffee is the chief export. Minor articles are brandy, sugar, hides, diamonds, tapioca, tobacco, medicinal herbs, gold dust, rosewood, and forest products. The bay has been filled with silt gradually, until ships of heavy draft have difficulty in approaching the shore. An artificial quay to cost many millions of dollars is under process of construction. A heavy wall of masonry is built at the edge of deep water, providing over two miles of wharfage. The space between the wharves and the old shore has been filled with earth, giving opportunity for the erection of warehouses and for the construction of railways.

The population of Rio de Janeiro was 1,157,873 in 1920. The present dominant element is Portuguese. The city has a system of electric street cars and is well lighted. On September 7, 1922 there opened at this city the greatest exposition in Brazil's history, the Centennial Exposition, held for the double purpose of celebrating the country's independence and to stimulate Brazilian trade. The United States, Mexico, all South American states and many European nations were represented. See BRAZIL; COFFEE.

Rio Grande, a well known river of the Southwest. The name is Spanish for great river. The Rio Grande rises between the folds of the Rocky Mountains in the southwest of Colorado. It flows in a southeasterly direction, 1,800 miles into the Gulf of Mexico. For 1,100 miles it forms the boundary between Mexico and the United States. Shallow draft steamboats come up to a point 450 miles from the Gulf. The river is flooded at seasons by melting snows and by rains about its upper course. The main portion of the stream lies in a semi-arid region, through which it is reduced in the dry season almost to a series of gravel bars. The plains on both sides of the Rio Grande

were, until of late, the undisputed kingdom of the cattlemen, but the gardener and farmer are pressing in. The lower part of the valley is declared the most favorable region on the North American continent for the production of the Bermuda onion and vegetables for the early market. The waters of the Rio have been impounded by dams and turned into irrigating canals. One of these canals, near San Benito, Texas, fills a basin a mile and a half long, water from which is distributed by 114 miles of irrigating ditches. Before the water reaches the Rio again it has irrigated 30,000 acres, converting an area of sparse grass, arid sagebrush, and mesquite into fertile farms. Main line railroads reach the river at Brownsville, Laredo, Eagle Pass, and El Paso. Labor of all kinds is performed chiefly by Mexicans who work under their own foremen. Lands in the best part of the valley are now worth as many dollars per acre as they were worth cents twenty years ago.

Riparian Rights, the rights of a landowner, whose property borders upon a stream, to that portion of the bed of the river (to its center) which is adjacent to his land. He has a right to fish in the stream, is entitled to a reasonable use of the water, and is permitted to use the accretions of the soil. He may construct bridges, wharves, dams, and piers, provided they do not interfere with the rights of others. He has not a right to divert the stream out of its natural course, nor can he pollute its waters, for, while he is entitled to a fair share of the use of the waters, he is not entitled to the water itself.

Riprap, a name commonly applied to a wall of broken stones laid up loosely for protective purposes. Railroad embankments are faced with a loose, slanting wall of this description to prevent their being washed away by encroaching streams. In Europe where labor is cheap and bottom land is valuable, the shores of rivers are not infrequently riprapped to prevent the carrying away of rich soil. The Swiss banks of the Rhone and other streams are protected in this way. Riprap on a shore with little dip is practically a sort of paving. The term is applied also to heaps of broken stone dumped in a river just above piers and abutments to break the force of the current. See GALVESTON.

Rip Van Winkle, a character in a story of the same name by Washington Irving, published in *The Sketch Book* in 1819. The scene is laid in the Catskill Mountains where Rip Van Winkle, an easy-going "ne'er do weel," sleeps for twenty years and awakens to find changes in his home and native village which are to him most marvelous. The character is one of Irving's greatest creations and has been given added popularity by the actor, Joseph Jefferson. The story has been dramatized several times. Jefferson altered it and made it one of his most important rôles.

Rittenhouse, David (1732-1796), an American historian and mathematician. He was born at Germantown and died at Philadelphia. His great-grandfather was a Mennonite from Arnheim, Holland; his mother was a Welsh Quaker. David was a vigorous boy, fond of mechanical inventions. His father set him up as a clockmaker. The activities of Rittenhouse were so numerous and so varied that only the more prominent can be noticed. It is claimed that he worked out independently the system of calculus for which credit is given Leibnitz and Newton. He had reputation as a surveyor. He laid out the boundary between Pennsylvania and Delaware. It is the arc of a circle having a twelve mile radius with the center at Newcastle. He also located the point where the 42d parallel, the boundary between Pennsylvania and New York, crosses the Delaware. As an astronomer, he won no little reputation by computing the parallax of the sun. This he obtained by observing the transit of Venus in 1769. His preparations were made with care. Everything went well. He was so exhausted when the transit was over that he fell in a faint. He was the first to suggest stretching spider lines across the aperture of the telescope.

Rittenhouse took an active part as an engineer during the Revolutionary War. President Washington appointed him director of the first United States mint. For a number of years he was professor of astronomy in the University of Pennsylvania. Mr. Rittenhouse had little or no edu-

cation of the schools, yet he was recognized by European scientists as one of the most scholarly men living. Membership in various learned societies was conferred on him. In 1790 he succeeded Franklin as president of the American Philosophical Society. He published a number of transactions. Thomas Jefferson said of him, "We have supposed Rittenhouse second to no astronomer living; that in genius he must be first, because he is self taught." A planetarium constructed by him is now in possession of Princeton University.

Ritter, Karl (1779-1859), a celebrated German geographer. He was a native of Quedlinburg, Prussia. His father was a physician. In his boyhood he is said to have been a poor hand at matching pennies, but he had the reputation of making the best maps in school. He was educated at the University of Halle. He was a tutor in the family of a Frankfort banker for fifteen years. He accompanied the sons of his employer to the University of Göttingen, where he himself had opportunity for study, and where he wrote a work entitled *Geography in Relation to Nature and to the History of Man.* In 1820 he was made professor extraordinary of geography at the University of Berlin, a position which he retained to the time of his death. His professorial duties were light. He devoted his time mainly to geographical research and writing. His contributions to science and geography are stated as three-fold. He brought the subject into general repute by reason of his own learning and reputation as an instructor and writer. He emphasized the work done by rivers, glaciers, winds, tides, and other geographical features, asserting that the earth should be studied like the human system, each agency receiving attention, just as the several organs receive attention in the study of human physiology. In this respect he may be considered the promoter, if not the founder, of modern physiography. His third service consisted in the compilation of geographical facts. He devoted nineteen volumes to the geography of Asia and Africa. He also wrote a separate geography of Europe. We regret he did not live to cover the entire world in the same way.

River, a considerable stream of water flowing through the land. Rivers are surface drains carrying the water from rain and snow downward to sea level. The current is due to gravity. Owing to the spheroidal shape of the earth, the mouth of the Mississippi River is farther from the center of the earth than is its source. The same statement holds true for any large river flowing southward in the northern hemisphere. In thus flowing farther from the center of the earth, the action is due to centrifugal force, the same force that gives the earth its spheroid shape. The general pathway of a river is called its course. The groove through which it flows is its channel or bed. The area drained by a river is its basin. The volume of water carried to the sea depends, generally speaking, on the amount of water falling in its basin; but this is not always the case. The Nile, the Ganges, the Rio Grande, and other rivers that might be mentioned, flowing through arid districts, lose a considerable part of their water by evaporation.

In physical geography, a river that has reduced its basin to a comparative level is called an old river, regardless of its age. A river that still flows through gorges is called a new river, although geologically speaking, it may be of ancient origin. When a river is formed by the union of several large streams, the name of the largest and longest is written usually below the point of junction. The Missouri-Mississippi is a marked exception to this rule. The Missouri is far longer than the Mississippi above the point of junction. The St. Lawrence forms another marked exception. The St. Louis River, the Sault Ste. Marie, the Detroit, and the Niagara are all parts of the same waterway.

It is customary in Great Britain to prefix the word river to the name. Thus they say the River Mersey and the River Clyde; but in America the position is reversed. We speak of the St. Lawrence River, the Saskatchewan River, the Arkansas River, the Hudson River, etc.

Of well known rivers, the Amazon is the largest. It contains the most water. The Missouri-Mississippi is the longest; the Thames is the most frequented; the Rhone

is the most rapid; the Rhine is the most celebrated; the Volga is the largest inland stream; the Colorado has the most wonderful cañon; the Columbia is the most noted for fisheries; the Danube has witnessed the greatest struggles for its possession. In proportion to its volume, the St. Lawrence has the smallest tributaries. The Yukon is the most surprising, the least known, of great rivers.

IMPORTANT RIVERS.

	Length, Miles.	Area of Basin, Sq. M.
NORTH AMERICA.		
Colorado	1,750	230,000
Columbia	1,200	265,000
Mackenzie	2,300	600,000
Mississippi (Missouri)	4,650	1,300,000
Rio Grande	1,800	245,000
Saskatchewan	1,600	432,000
St. Lawrence	2,200	410,000
Yukon	2,000	200,000
SOUTH AMERICA.		
Amazon	4,000	2,500,000
Orinoco	1,570	366,000
Rio de la Plata and Parana	2,500	1,240,000
San Francisco	1,600	254,000
EUROPE.		
Danube	1,725	310,000
Dnieper	1,230	200,000
Don	1,300	205,000
Dwina	1,000	142,000
Elbe	780	57,000
Loire	600	48,000
Neva	40	91,000
Oder	550	53,000
Petchora	900	100,000
Rhine	600	66,800
Rhone	580	38,000
Seine	497	30,000
Tagus	550	34,000
Thames	220	6,160
Ural	1,000	106,000
Vistula	530	76,000
Volga	2,400	400,000
ASIA.		
Amur	2,739	786,000
Euphrates	1,750	127,000
Ganges	1,600	432,480
Hoang-ho	2,700	200,000
Indus	2,000	328,400
Irawaddy	1,200	100,000
Kolima	700	107,000
Lena	2,400	960,000
Mekong	1,500	400,000
Obi	3,000	1,250,000
Yang-tse-Kiang	3,302	950,000
Yenisei and Angara	3,500	1,100,000
AFRICA.		
Kongo	2,900	1,300,000
Niger	3,000	800,000
Nile	4.100	1.425.000
Orange	1,000	446,000
Senegal	1,000	1,300,000
Zambesi	1,800	900,000
AUSTRALIA.		
Murray	1,120	270,000

There's no music like a little river's. It plays the same tune (and that's the favorite) over and over again, and yet does not weary of it like men fiddlers. It takes the mind out of doors; and though we should be grateful for good houses, there is, after all, no house like God's out-of-doors. And lastly, sir, it quiets a man down like saying his prayers.—Robert Louis Stevenson.

A river is the most human and companionable of all inanimate things. It has a life, a character, a voice of its own, and is as full of good fellowship as a sugar-maple is of sap. It can talk in various tones, loud or low, and of many subjects, grave and gay. . . . For real company and friendship, there is nothing outside of the animal kingdom that is comparable to a river.—Henry Van Dyke.

Riverside, Cal., the county seat of Riverside County, is one of the most important centers in the United States of the citrus fruit growing and packing industry. It has a beautiful location, 57 miles east of Los Angeles, and about 900 feet above sea level. Because of its attractive surroundings and healthful climate, Riverside is popular as a health resort. It is in the San Bernardino Valley, which is extensively irrigated. The chief products of the district are oranges, lemons and alfalfa hay, named in the order of their importance. Portland cement is manufactured in Riverside, and there are fruit canneries and packing plants.

Riverside contains a state citrus experiment station, and Sherman Institute—a United States Indian School. It has good public schools and a Carnegie library. Attractive features are Magnolia Avenue—a wide drive lined with pepper trees—and the many fine examples of the mission style of architecture. Population in 1920, 19,341.

Rives, Amelie (1863-), an American novelist and poet, since 1896 Princess Troubetzkoy. She was born at Richmond, Va., and was educated privately. Beginning to write at an early age, some of her stories appeared in the *Atlantic Monthly*, but attracted little attention. In 1888 her first book, *A Brother to Dragons*, appeared;

this was followed in the same year by the novel that set the nation talking, *The Quick or The Dead*. It describes the spiritual struggle of a woman who has lost her husband, whom she worshipped, and has won the love of his cousin. At the end she finds that the power of the dead is great and refuses to marry her dead husband's cousin. This book was attacked and applauded, and created a discussion that lasted for months. In 1888, Miss Rives married J. A. Chandler, of New York, but subsequently divorced him. In 1896 she became the wife of a Russian, Prince Troubetzkoy. Other works by Miss Rives are *According to St. John, Virginia of Virginia, The Witness of the Sun, Hidden House, World's End* and *Shadows of Flames*.

Riviera, the popular name of the narrow, temperate, beautiful coast of Italy and France, stretching for about 175 miles along the Gulf of Genoa. It is one of the most famous health and winter resorts, as well as one of the most beautiful spots, in the world. The winds from the north and east are cut off by the Alps, while it gets the full effect of the winds from the south. From Nice, in France, the Riviera extends around the gulf to Spezia, in Italy, with such cities as Monte Carlo, Monaco, Mentone, Bordighera, San Remo, Rapallo and Levanto between. On the eastern end the coast is more rugged and bold than on the west, where sandy beaches run down to the sea. Along this coast the vegetation is luxuriant and almost all subtropical fruits are grown.

Rivingston, James (1724-1802), a Tory book-seller in New York at the time of the Revolutionary War. He came to the colonies in 1760 and opened a bookshop in Wall Street, where he proceeded to publish several periodicals from a Royalist viewpoint, including *The New York Gazeteer, New Jersey, Quebec Weekly Advertiser* and *Connecticut*. He continued this bitter Tory propaganda until Captain Isaac of the Sons of Liberty entered his shop in 1775 and destroyed all his printing facilities. He was tried, but allowed to go free. However, at this time Mr. Rivingston decided to revisit England, where the king appointed him official printer for New York. To that city he returned in 1717, where he published *Rivingston's New York Loyal Gazette,* the name of which was later changed to *Royal Gazette*. During the latter part of the War, Rivingston turned spy for Washington, and apparently became a sympathizer of the colonists. When he published *Rivingston's New York Gazette and Universal Advertiser,* however, the people had lost faith in him and the project was a failure.

Roach, John (1815-87), an American shipbuilder of Irish descent, who came to the United States at the age of fourteen years. At his yards were constructed some of the most famous and durable ships of American make, including *The Dolphin, The Boston, The Chicago* and *The Atlanta*. Due to the rejection by the government of one of his ships, the yards were closed for a short time, but they were reopened by his son, John B. Roach.

Road, an open highway for the passage of vehicles. The noun, road, is akin to the verb, ride, and indicates that the road is to be distinguished from the footpath. The early American colonists found no roads and needed none, for they brought no vehicles with them. Commodities were carried by boat; where water failed, men carried peltry and supplies in packs, or else transportation was managed by means of pack animals. Early trade followed the coast, the rivers, and Indian trails.

The earliest American roads were constructed in Virginia and led from interior plantations to the landings on the waterways. Hogsheads of tobacco were fitted with a pair of shafts for a horse, and were trundled along these roads to the barge landings. Supplies for the planters were hauled home in rude carts. As towns sprang up, roads were built. Road building in the Atlantic colonies was no easy affair. The country was wooded densely, and streams were frequent; currents swollen by rain and thaw were likely to carry away the rude log bridges. The western traveler took a horse and a pair of saddle bags rather than a coach in which to flounder in mire and pitch over stumps and roots. Many of the early thoroughfares were built by colonial appropriations. Toll houses and charges for the privilege of using the

highway were not infrequent. The problem of building roads on the level prairies of the Mississippi Valley is a different affair.

So far as quality is concerned, America has not been famous for road building, but, in point of quantity, a plea may be entered. During the three centuries of white occupancy, over 2,151,000 miles of road have been constructed—enough to follow the equator around the globe eighty-six times and a lap over. About 40,000 miles are paved or are surfaced with stone, over 100,000 miles are surfaced with gravel, and about 10,000 miles have been surfaced with special materials. At present prices of real estate, the roadways are worth $342,000,000 as farming land. The present value of American roads, including right of way and cost of construction, is estimated by the United States Department of Agriculture at $1,720,339,000. Not less than 250,000,000 tons of freight are hauled from farms to the railway station each year. Figuring in the cost of men and teams and the wear of vehicles, the cost of hauling is not less than twenty-three cents per ton per mile. When we reflect that the railways, with their costly roads, expensive equipment, and large quantities of freight, make money by hauling fourth class freight for long distances at an average rate of one cent per ton per mile, it is evident that the farmer's twenty-three cents is excessive. The farmer's haul is, on an average, nine miles. The average cost of hauling farm produce to market is $2.09 per ton. The railroads carry 1,145,000,000 tons of freight a year, all of it from one station to another and much of it from ocean to ocean, for an average of $1.57 per ton—less than it costs the farmer to get his produce to town if he counts his time worth anything. With better roads larger loads could be hauled and light loads could be taken in less time. With better roads it ought not to be difficult to cut the expense of marketing in two.

One of the first steps toward better roads is the organization of districts large enough or at least long enough to include an entire road. Local road building is a failure. This was demonstrated in England at an early day. The enormous freight traffic carried on by the carters between York and London kept the roads in a mire that the local parishes could not mend. It was necessary for the government to take hold of the matter. Likewise, in this country, it is not only impracticable, but unfair, to expect local communities to keep main thoroughfares in order.

A second step that should be taken is the payment of road taxes in money instead of labor. It is all well enough for the first settlers, men without money, to get together for a day or two to build roads; but such a system is primitive and does not result in good roads. Money, too, expended judiciously under competent supervision, will do in ten years more to provide creditable roads than a century of the system of "working out" a road tax under which one-half of those called have no heart in the work and the other half are impatient to be at home plowing corn.

More time and money should be spent in preventing roads from getting into bad condition. An ounce of gravel by way of prevention is better than a pound of cure thrown into a later mud hole. It is not enough to build roads. They must be watched. A man, a cart, a horse, and a gravel pit kept busy all summer are worth five times as much toward maintaining good roads as the same amount of expenditure crowded into a hurried week between corn planting and corn plowing.

Methods of road building must differ in different localities. In all soils it is necessary to take the water away from the road by drainage, or take the road away from the water by elevating the roadbed. It is useless to build a road without first providing for a dry roadbed. Standing water and traffic will reduce any soil to a quagmire. The first step toward building a permanent road is a system of permanent drainage. Tile drainage is apt to prove most satisfactory. Ordinarily a tile laid along under one gutter with an occasional twenty-foot cross spur will be sufficient. Drainage of this sort is not expensive nor is it hard to lay. The chief difficulty lies in securing a proper outlet.

Next to drainage comes grading. Most roads are too wide. The narrower the roadway, the needs of traffic and the passing of teams provided for, the easier it is to keep a road from soaking full of water. The sur-

face should be rounded slightly to shed water. Ruts should be filled as fast as they form. Here is where a caretaker on the road for the season gets in his best work. Instead of allowing water to stand in ruts and soften the road bed, he prevents ruts from forming and keeps his road dry; for a well built, well hardened road turns water like the roof of a barn.

THE GOOD ROADS MOVEMENT. The movement in the interest of good roads in the United States is of comparatively recent date. The bicycle and the automobile have been important agents in creating the sentiment for better roads, but until recently the great majority of farmers have opposed increased taxation for improving highways. But the economic value of good roads has been so clearly demonstrated by the United States Department of Agriculture and the state agricultural colleges that the farmers now realize that money expended for good roads is money wisely invested. A good road enables the farmer to market his produce at much less expense and at the same time when it will sell at the highest price.

In 1913 the Department of Agriculture organized the Office of Public Roads. At first the assistance of the department was limited to the "good roads train," which was in charge of competent road engineers and equipped with the best road-making machinery. The train visited all parts of the country, stopping at important rural centers where a short piece of road was made. The coming of the train was advertised several days in advance so that those interested might be present to learn what they could from the demonstration.

In 1914 Congress appropriated $25,000,000 a year to be divided among the states for the improvement of roads, and the Sixty-fifth Congress (1917-1919) contracted to expend $266,750,000 within the next three years. This sum was to be apportioned among the states in accordance with the amount each state appropriated for improving highways. By this plan, eventually $535,500,000 will be expended in improving the highways of the country.

Rural communities are realizing that road making requires a good degree of engineering skill, and state colleges are offering courses in road engineering. The old road district is becoming a thing of the past and the roads are passing under the control of the county, the state or the nation.

NATIONAL HIGHWAYS. The United States builds and maintains the roads in the national parks. Besides these the government has constructed only one national road, the Cumberland Road, extending from Baltimore, Md., to Vandalia, Ill. A national highway has been projected to connect all the national parks, and a movement has been started to construct an international road from Winnipeg to the Gulf of Mexico. A number of highways of national scope are being constructed by the respective states through which they pass. The most important of these are:

Lincoln Highway, a road extending from Newark, N. J., to San Francisco, California. The road was named for Abraham Lincoln. Its length is 3,331 miles and it is the longest road in the world. Beginning at Newark, N. J., the route extends southwest to Philadelphia, thence westward across Pennsylvania, Ohio, Indiana, Illinios, Iowa, Nebraska, Wyoming, Utah, Nevada and California. It passes through Pittsburgh, Mansfield, Joliet, Council Bluffs, Omaha, Cheyenne, Salt Lake City and Sacramento. A branch extends from Cheyenne to Denver, and another from Reno to Carson City. Markers at frequent intervals identify the entire route.

Dixie Highway. This is a surfaced road extending across the United States from north to south. Beginning at Mackinaw, Mich., two routes extend along each side of that state and cross Ohio, Indiana, Kentucky and Tennessee, uniting at Chattanooga. Thence the route extends through Georgia, touching Atlanta and Macon, to Tallahassee, Jacksonville and Miami, Fla. A branch connects Chicago and Indianapolis. It is expected that this highway will increase automobile travel between the North and the South, and encourage the building of better roads in the states that it crosses.

Road Runner, or **Chaparral-Cock,** a bird belonging to the species ground-cuckoo. It is about two feet long including its very long tail, with short wings, heavy legs, long bill and crested head of dark blue. The color of the body is bronze-green, streaked with white. It uses its wings in running and seldom flies, but on the ground it is said to keep pace with a swift horse. It is limited to Mexico and the southwestern part of the United States. It is also called ground cuckoo, paisano, or snake-killer.

Roanoke, Ró-a-noke, Va., chief city of southwest Virginia, is in Roanoke County, 179 miles west of Richmond and 227 miles southwest of Washington, on the Roanoke River and the Norfolk & Western and Virginian railroads. The city is 907 feet above sea level and is situated in the beautiful Roanoke Valley, a part of the Valley of Virginia. Its picturesque location and its proximity to noted sulphur springs make it a prominent health resort. Roanoke covers an area of 9.58 square miles, has a well-equipped local and interurban trolley system, an artificial gas plant, a telephone system and an excellent water supply. Electric current is furnished from plants on the Roanoke and New rivers and from a steam-power station. The municipally owned parks are Elmwood, Highland, Melrose and Belmont, while Kimball, Crystal Springs, Lakeside and Mill Mountain parks are privately owned. The latter is on top of Mill Mountain, a beautiful eminence overlooking Roanoke from the southeast and giving magnificent views for many miles around. This mountain tower is 900 feet above the city and is reached by an electric incline railway.

The noteworthy buildings include the city hall, Masonic Temple, Elks' Home, Eagles' Home, Federal building, National Exchange Bank, First National Bank, Mountain Trust Bank, Payne, Terry, Thomas, MacBain, Anchor and Times buildings, Norfolk & Western office building, a Y. M. C. A., Jefferson and Roanoke theaters, Academy of Music and five hospitals. There are several hotels, including the Hotel Roanoke, the Ponce de Leon, the Powhatan, the Lenox and the Shenandoah. Other buildings are St. Vincent's Orphan Asylum, two business colleges, about 40 churches and numerous handsome residences. The excellent school system includes a new $600,000 high school, two junior high schools and a high school for colored students, all with vocational training and domestic science departments; ten white elementary and two colored elementary schools, and St. Andres' and Nazareth parochial schools. Near the city are Hollins and Virginia colleges for girls, Roanoke College for boys and Daleville College for boys and girls.

Roanoke is the general office and shop headquarters of the Norfolk & Western Railroad, its plant covering 60 acres; and is the midway point of the Virginia Railway. The manufacturing enterprises include railway shops, two structural iron and steel plants (one also building steel cars), furnaces, foundries, machine works, a pyrites mill, printing shops, marble and granite works and manufactories of tramways, tin cans, staves and barrels, wooden and metal products, type cabinets, store fixtures, twine, overalls, soft drinks, flour and feed, confectionery, lumber and medicines. Stock raising, fruit growing, trucking, canning and coal and iron mining are the most important district industries.

Big Lick station, established by the Virginia & Tennessee Railroad in 1852, was incorporated as a town in 1874. The name was changed to Roanoke in 1882 and a city charter granted in 1884. Population in 1920, 50,842.

Robbery, in the calendar of punishable offenses, taking by violence or intimidation the property of another. Thus it is distinguished from larceny by being a crime against property and against the person. The value of the property taken has little or no mitigating influence in a court, and in England, Canada and the United States the crime is punishable by imprisonment. If robbery be committed on a street or highway it is termed "highway robbery."

Robbia, Della, the family name of two noted sculptors of the early Renaissance.

Luca della Robbia (1399-1482), was born at Florence, the son of a shoemaker. When a youth he was apprenticed to a goldsmith, but the goldsmith's craft he forsook to work in bronze and marble. His name

and fame as a worker in glazed or enameled terra cotta—known as "Robbia ware"—spread throughout Europe. His most important extant works are the *Singing Galleries,* which, consisting of ten panels in high relief in marble, were made for an organ gallery of the Duomo and are now in the Cathedral Museum; *Deliverance* and *Crucifixion of St. Peter,* two unfinished marble reliefs now in the Museo Nazionale; *The Liberal Arts and Representatives,* on the north side of the Campanile. In Florence are to be seen almost all of his works. Besides those mentioned, the Museo Nazionale contains his *Resurrection, Ascension* and *The Virtues.*

Andrea della Robbia (1437-1528), the nephew of Luca della Robbia, studied under his famous uncle, but confined his activity, with a single exception, to work in terra cotta. The Museo Nazionale preserves numerous figures of the Madonna by Andrea, and other works by him are to be found at Verna, Arezzo, Siena and Berlin. His later work suffers from the absence of his uncle's influence. The exception to his work in terra cotta is a marble altarpiece in Santa Maria della Grazie, near Arezzo. Andrea had five sons who carried on his art but added nothing to it.

Robert, Charles George Douglas (1860-) a Canadian author. He was born at Douglas, New Brunswick. In 1883 he became editor of a Toronto paper and later professor of English and French literature in King's College, Windsor, Nova Scotia. He has written acceptable verse and many volumes of prose. He is best known for his stories of animal life in the northern forests. His books include *Kindred of the Wild, Forge in the Forest, Haunters of the Silences,* and *Heart of the Ancient Wood.*

Roberts, Frederick Sleigh, Lord (1832-1914), an English military officer. He was born in Cawnpore, India, and was educated in Eton and in the cadet college at Addiscombe in preparation for a military career. He entered the Bengal artillery as second lieutenant in 1851, and in 1857 he was promoted to the rank of lieutenant. In 1880 he set out with an army of 10.000 men for the relief of Kandahar, the British garrison then besieged by Ayub Khan. His success brought him an enthusiastic reception upon his return to England. In 1890 he received rank in India as general. He returned to England in 1893, and two years later he was made field-marshal in Ireland. He soon after retired to private life; but in 1899 when the British situation in South Africa was growing precarious, he assumed command of the army, and soon brought the war to a successful termination. Great honors were paid him including his appointment as commander-in-chief of the army and his being granted the titles of Earl Roberts of Kandahar, Pretoria, and Waterford, and Viscount Saint Pierre.

Robertson, John Ross, (1841-), a Canadian journalist, was born at Toronto and educated at Upper Canada College. Upon graduation he entered upon a career of journalism, serving as reporter on several newspapers, and as city editor of the Toronto *Daily Globe* during 1864-66. In the latter year he assisted in founding the *Daily Telegraph.* From 1872 to 1875 he represented the *Daily Globe* in London, Eng. In 1876 Mr. Robertson founded one of the most successful and influential newspapers in Canada—the Toronto *Evening Telegram.* He was elected to the Dominion House of Commons in 1896. Mr. Robertson was an influential Freemason, and wrote histories of the Freemasons and of the Knights Templars in Canada. He also wrote *Robertson's Landmarks of Canada* and *Talks with Craftsmen.*

Robertson, William (1721-1793), a Scottish historian. He was educated as a Presbyterian minister and became the president of the University of Edinburgh. His *History of Scotland* was long a standard. He wrote a *History of Charles V,* for which his publishers paid him the hitherto unequaled price of $25,000.

Robespierre, ro'bes-peer (1758-1794), a famous French Revolutionary leader. In 1789 he became a member of the States-General. At this time he was nervous and timid, and earnest to the verge of fanaticism. Finding the Assembly not in favor of his measures, he became a member of the Jacobin Club. Although a very active and bitter Revolutionist, he is said to have taker no part whatever in the sack of the Tuile-

ries and to have consented reluctantly to the execution of the king. His words were, "It is with regret that I pronounce the fatal truth, Louis ought to perish rather than a hundred thousand citizens. Louis must die that the country may live." Robespierre was a central figure in opposition to the Girondists, and in 1793 he was made a member of the Committee of Public Safety.

The defenders of Robespierre's character are willing to admit that he was a fanatic, but they deny that he was the promoter of the Reign of Terror. They call attention to the fact that he belonged to a minority of the Committee of Public Safety. However that may be, it is certain that Marat, Danton, and Robespierre were the master spirits of this terrible period, and that after Marat had fallen under the dagger stroke of Charlotte Corday, Robespierre sent Danton to the block and was supreme for several months, during which the number of daily executions reached its greatest height. Whatever sentiments of mercy may have moved the younger man, history cannot fail to record that during his period of responsibility thousands of persons were sent to the guillotine, and that the very gutters of the Place de la Concorde ran with the best blood of France. It is a relief to read that he refused to permit the execution of a rival lawyer who had in earlier days won a literary prize over his head and had boasted of his victory in the Paris newspapers. Robespierre, it is said, declared that personal feelings had no place at a time of such public extremity, that the blood of aristocrats must flow, not for reasons of hatred, but for the good of oppressed France. Finally his day of reckoning came. France triumphed over the mob element of Paris. July 28, 1794, Robespierre, Saint-Just, a devoted and scholarly adherent, and nineteen associates were sent to the fatal place of execution.

In his private life, Robespierre carried himself with respectability. He had a soft, cultured voice, and, though a leader of the mob element, he always dressed like a French gentleman, wearing silk stockings and silver buckles to the last. He was not a coarse, ferocious man. His life was simple and industrious. His word was true, his honesty unimpeachable. Had Marie Antoinette and the aristocracy shown a grain of sympathy for the poor of France, or had any other practical way of righting wrongs opened, there is no reason to believe that Robespierre would ever have been connected with the atrocities of which the historian holds him guilty. The starving, mutilating, maiming, and murdering of peasants had gone on unnoted for centuries in the byways and villages of France. Retribution, not always just, simply burst out like a flame in the most public place of the most public city in the world. Robespierre was a witness—an instrument—but not the creator of the Reign of Terror. A vivid description of this period and the work of Robespierre and Danton may be found in Victor Hugo's *Ninety-Three*.

See MARAT; FRENCH REVOLUTION; DANTON.

Robin, the familiar name of a small red-breasted European bird. The English robin is a familiar frequenter of parks, dooryards, and fields, living on seeds and insects and worms. It is a sweet singer. Robin Redbreast is a familiar character in juvenile literature. Few children have not thought kindly of the robin as they have heard how he covered the "Babes in the Wood" with leaves.

The American robin has a red breast also, but it is unfortunately named. It is really a large thrush, with the familiar, kindly ways of the robin for which the early settlers named it. It is found from eastern Mexico to Alaska, throughout North America east of the Rocky Mountains. It winters in the southern half of its range. The robin is a fine singer. The nest, made of twigs and coarse grass, lined with mud and fine grasses, is placed preferably in the crotch of a low scrub oak or fruit tree. Eggs, three to five, greenish blue. To thrive, young robins require their own weight of worms daily. Early in the season the robin lives chiefly on grubs and worms, which it is an expert in locating in lawns. Later, it is quite an adept at making off with cherries. In autumn, Northern robins migrate to the Gulf States. Their winter food consists largely of berries, like those of the American ivy, holly, cedar, and mistletoe. In early spring, robin is back again. "The return of the robin is com-

monly announced by the newspapers, like that of eminent or notorious people to a wateringplace, as the first authentic notification of spring," says Lowell. The following lines by Lucy Larcom show how secure Robin is of popular favor:

> Rollicking Robin is here again.
> What does he care for the April rain!
> Care for it? Glad of it. Doesn't he know
> That the April rain carries off the snow,
> And coaxes out leaves to shadow his nest,
> And washes his pretty red Easter vest,
> And makes the juice of the cherry sweet
> For his hungry little robins to eat?

An attempt is now being made to introduce the American robin into England. During the summer of 1909 several pairs

Robin.

of robins nested and raised young in their new home, and seemed as content as if on their native soil.

Robin Good Fellow. See PUCK.

Robin Hood, a noted English outlaw. He is said to have lived about 1160-1247. According to popular belief, he surrounded himself with a band of daring spirits and lived by killing the king's deer and relieving the purses of fat churchmen and travelers. The greenwood of Sherwood Forest in Nottinghamshire and the vales of Barnesdale were his home. According to one account, he was a staunch Saxon driven to the forest to escape the tyranny of the Normans. At any rate, he was a bold spirit. Little John, a man of gigantic stature and a master stroke with the quarterstaff and broadsword, was his lieutenant. Friar Tuck played the priest in time of need. Will Stutely, Will Scarlet, and Midge, the miller's son, were of the band. They built huts of bark and branches. They slept on beds of leaves covered with the skins of deer. They built roaring campfires and feasted on venison and wine. Allan-a-Dale, the minstrel, gave them music for their dancing, and Robin himself taught them to fit the arrow and wield the cudgel. They lived a boisterous, outdoor life. The fat abbots, the sheriff, that is to say the judge, of Nottinghamshire, and the Bishop of Hereford were their aversion. Every innkeeper within a days' journey of the forest was in league with them. They plundered the wealthy and aided the poor. Woe betide the proud noble who ventured to oppress a poor man. His game was killed, his cattle were stolen, and it behooved him to keep his armor closed in passing a copse lest a gray goose shaft sped from the bow of Robin or one of his men reach him. Robin and his followers made it their boast that they never hurt fair maid or man in woman's company.

At the end of his adventures Robin fell ill of a fever. He applied for aid to the treacherous prioress of the nunnery of Kirklees. According to the medical practice of the day, she let his blood, but unsuspected

by Robin, allowed his very life to bleed away. In his weakness, he blew three weak blasts on his horn. His faithful followers came, but too late. Robin raised himself by a last effort, looked out through the window, drew his bow for the last time, and directed that he be buried where his arrow fell.

The first mention of Robin Hood in literature occurs in *Piers Plowman,* the date of which is about 1377. A loutish country lad, Sloth by name, professes little knowledge of the Lord's Prayer, but knows the rhymes of Robin Hood. The literary material pertaining to Robin Hood—ballads and country-side traditions — have been woven into a connected tale by more than one writer. One of the most successful attempts is *The Merry Adventures of Robin Hood* by Howard Pyle. Under the name of Locksley, Scott introduces Robin and his band of archers in *Ivanhoe.*

Robinson, Sir John Beverley (1791-1863), a Canadian jurist and statesman, was born at Berthier, Lower Canada (Quebec), and attended school at Kingston. Later he studied law, and in 1812, when but twenty-one years of age, he was called to the bar and in the same year he acted as attorney-general for Upper Canada. When the War of 1812 opened he enlisted. In 1815 he was appointed solicitor-general and three years later attorney-general. The latter office Sir John filled until 1829, when he was made chief justice of Upper Canada.

He entered the Upper Canada legislature as a Conservative in 1821, and during the struggle for responsible government was a vigorous opponent of the Reformers and the leader of that group of Conservatives known as the Family Compact. Sir John opposed the union of Upper and Lower Canada, even going to England in the attempt to prevent it. He retired from the political field in 1841, but retained the office of chief justice. As a jurist Sir John was extremely upright and able, and during his judicial career not one of his decisions was reversed by a court of appeal.

Robinson Crusoe. See DE FOE, DANIEL.

Robinson, John (1575-1625), the English pastor of the Pilgrims. He was born near Scrooby, Nottinghamshire, and was educated at Cambridge for the English priesthood. He was suspended from the Church of England for Puritan views and became pastor of the Scrooby Independent church in 1606. To escape persecution, he removed with his congregation in 1608 to Amsterdam, and a year later to Leyden. In 1620 the younger portion of his congregation, known in history as the Pilgrims, migrated to the New World, settling at Plymouth, Massachusetts. He hoped to follow later, but died in Holland.

Roblin, Sir Rodmond Palen (1853-), a Canadian statesman, was born in Prince Edward County, Ontario, and attended Albert College, Belleville, Ontario. He removed to the Province of Manitoba in 1880 and for some years was an agriculturist; later he set up as a grain merchant in Winnipeg. Here Sir Rodmond took an active part in municipal politics, and was later elected to the Manitoba legislature. He was a vigorous leader and a skilled debater, and his influence grew until in 1900 he was chosen premier of Manitoba. Sir Rodmond continued in this post until 1915, when charges of fraud in connection with building contracts for the government, forced the resignation of his ministry. No charges were made against the premier personally. He served during his premiership as Minister of Agriculture and as Land Commissioner, and was knighted in 1912.

Rob Roy, (about 1671-1734), a noted Highland chieftain. His real name was Robert McGregor, or Campbell. He was called Rob Roy or Red Rob with reference to a shock of red hair. He was an adherent of the Stuart family. In 1691 he descended on Stirlingshire. When the cause of the Stuarts became hopeless, he pursued the course of a Highland freebooter and was outlawed. He is the subject of Sir Walter Scott's novel *Rob Roy.*

Roc, a fabulous bird of such size that it carried off elephants to feed its young. The legend of the roc is oriental. It has been made familiar through the *Arabian Nights' Entertainments.* The popular notion may have originated in the great expanse of wing of the alpine eagle or lammergeier. An account in the *Arabian Nights'* tells of a passage at arms between a rhinoceros and an elephant, in which the rhinoceros

is credited with having killed the elephant by plunging its horn into its opponent's side; but fell itself, blinded by the blood and crushed beneath the weight of its bulky opponent. In this condition, a roc with wings like a windmill came and carried them both off to its nest. The recent discovery of a bird's skeleton not less than twelve feet in height lends just a shade of possibility to what has been considered a mere flight of oriental imagination.

Rochambeau, Jean Baptiste Donatien de Vimeur, Count de (1725-1807), a French soldier who rendered a great service to America by cooperating with General Washington against the English. He was born at Vendome, France, and was educated for the church. But in 1742 he joined the army, and distinguished himself during the War of the Austrian Succession. In 1749 he succeeded his father as governor of Vendome. During the Minorca Expedition of 1756, and during the Seven Years War with Germany he again won honors, and in 1780, with the rank of lieutenant-general, he was sent with 6,000 troops to aid General Washington against the British. General Rochambeau's army was kept inactive in Rhode Island for a year, because of the blockade of the French fleet by the British. Joining General Washington on the Hudson in 1781, General Rochambeau proved of great assistance. He took part in the fighting that culminated in the surrender of Cornwallis at Yorktown. Congress voted the thanks of the nation to the valiant Frenchman and his army. After his return to France in 1783 he was appointed governor of Artois and Picardy, and made a marshal of France. He manifested sympathy with the Revolutionary cause but was disgusted by the excesses of some of the leaders. He was imprisoned and narrowly escaped death on the guillotine. After order was restored in France. General Rochambeau's estates were returned to him.

Roche, William James (1860-), a Canadian physician and statesman, was born at Clandeboye, Ontario, and was educated at Trinity Medical College and at the University of Toronto. He began the practice of medicine in 1883, and shortly thereafter went west to Minnedosa, Manitoba, where he practiced for years. In 1896 Dr. Roche was elected to the Dominion House of Commons and thereafter served continuously. In 1911 he became Secretary of State in the Borden cabinet, and in 1912 was appointed Minister of the Interior and Superintendent of Indian Affairs. Roche was appointed chairman of the Civil Service commission of 1917. While practicing at Minnedosa, Dr. Roche was also a member of the Manitoba Medical Council. He is an exceedingly able thinker, debater and administrator, commanding the respect of colleagues and opponents and of his constituents.

Rochefort, rōsh'fôr, **Victor Henri, Count de Rochefort-Lucay** (1831-1913) a French journalist and politician. Born in Paris, he received his education at the College of Saint-Louis, and in 1863 became one of the editors of the *Figaro*. He lost his position on the staff because of too hostile attacks on the government, and at the emperor's request the audacious and brilliant satiric reviews ceased. He established *La Lanterne* in 1868, where he gave free vent to satire and ridicule. In 1869 he was elected to the Legislative Assembly. On the publication of the radical journal *Marseillaise* he was imprisoned because of his unrestricted attacks on the Second Empire. The defense of Gambetta's policy, the opposition to Thiers, and his sympathy with the Commune caused his arrest again in 1873, and he was sentenced to the penal colony of New Caledonia, from whence he made his escape the following year. He revived *La Lanterne* in Geneva and founded the paper *L'Intransigeant* in Paris in 1880. As a champion of Boulangism he suffered exile, but returned to Paris to live in 1895.

Rochelle, ro-shĕl', a city of France. It is situated on an arm of the Bay of Biscay. It was formerly the chief seat of power of the Huguenots. During the religious wars of France the privateers of Rochelle played havoc with the merchantmen of Catholic owners. After the massacre of St. Bartholomew the city withstood a siege six months, inflicted a loss of 20,000 men on the besiegers, and won out by a treaty granting liberty of worship to Calvinists.

During the reign of Louis XIII, Cardinal Richelieu decided that the fortifications of the city were a menace to the king's authority. He ordered them dismantled, but was not obeyed. He carried on a siege by sea and land for eight months. The town was forced finally to capitulate in October, 1628, but not before the besiegers had constructed a vast mole in front of the city cutting off communication with the sea. During the expansive period of France in the New World, Rochelle was the chief center of commerce with Canada. The city is now one of the strongly fortified ports of France. The harbor is one of the safest on the French coast. There are many ancient buildings with interesting turrets, towers, and belfries. The city is a center of trade in oysters, salt, barrels, copper and iron articles, and coal briquettes. The population is now 31,559.

Rochester, a city of New York. It is situated on both sides of the Genesee River. The Genesee here leaps down two precipices of eighty feet and ninety-six feet sheer descent, respectively. Among many bridges is one lined on either side with shops, quite in Old World fashion. The city lies in the midst of what was at one time the leading wheat-producing section of the Union. An abundance of grain and power made Rochester for a time the center of the American milling industry. The Erie Canal is carried across the river here by means of a stone aqueduct. The city is also a central point for several railway systems. In regard to industries, Rochester is now the first of American cities in the magnitude of its nursery and orchard interests. No other city in the world cans so much fruit. It is headquarters for the manufacture of microscopes, cameras, and other optical instruments. It is the third city in the Union in the manufacture of clothing and fourth in boots and shoes. The population is about 296,000. The natural beauty of the city has been enhanced by a series of public parks. There are over a hundred churches and numerous educational institutions, including the University of Rochester, a Baptist institution with about four hundred students. Rochester was long the home of the Fox sisters, the founders of modern spiritualism, and of Frederick Douglass, the eloquent colored abolitionist. Sam Patch, a famous athlete of whom boys have heard, lived here. He made a specialty of leaping from the masts of ships and from bridges, as at Niagara and Passaic, New Jersey. In 1829 he advertised an exhibition leap over one of the falls in the Genesee at Rochester. He made the leap but lost his life.

Rock, in geology any solid portion of the earth's crust. This definition includes sand, clay, and the other kinds of earth, as well as the various sorts of stone. From the viewpoint of the chemist, oxygen forms a half of all the rocks, and silicon, an element of sand, forms a fourth. The remaining fourth is composed chiefly of aluminum, iron, calcium (lime), sodium (salt), potassium, and magnesium. The remaining sixty elements, all taken together, contribute less than one per cent of the rock material of the globe. See GRANITE; QUARTZ; FELDSPAR; MICA; KAOLIN; SALT; GYPSUM; CLAY; LIMESTONE; SANDSTONE.

Rockefeller, John Davison, an American millionaire. He was born at Richford, New York, July 8, 1839. He was educated in the public schools of Cleveland. He began life as a clerk and worked his way along as a bookkeeper and cashier. In 1858 he became a member of a firm dealing in oil. In 1865 he built the Standard Oil works at Cleveland, and in 1870 the Standard Oil Company was incorporated with Rockefeller as President. Mr. Rockefeller is enormously wealthy. He owns a half interest in the Standard Oil Company which controls practically the world's supply of petroleum. He has large holdings of railroad stock and other securities. His income from oil is $20,000,000; his income from other sources is believed to be even greater, bringing the total up to not less than $53,000,000 a year. Mr. Rockefeller has given what seem large sums to various causes and institutions. The total, January 1, 1918, was placed at $300,000,000. The following is a statement of his principal gifts, an amount equivalent in all approximately to about two years' income:

Rockefeller Foundation	180,000,000
General education board	115,000,000
University of Chicago	27,309,000
Rush Medical College	6,000,000
Obstetric Hospital, London	6,000,000

Missions and Churches (known)	5,400,000
Rochester Medical School	5,000,000
Rockefeller Institute for Medical Research	4,600,000
Vanderbilt University	4,000,000
Yale University	2,582,000
Washington University	2,345,000
Johns Hopkins	2,200,000
Baptist foreign mission fund	2,000,000
Barnard College	1,375,000
Southern education fund	1,125,000
Union Theological Seminary	1,100,000
Columbia University	1,100,000
Harvard University	1,000,000
Baptist Educational Society	1,000,000
Juvenile reformatories	1,000,000
Cleveland city parks	1,000,000
"Hookworm" fund	1,000,000
Nine Y. M. C. Associations	845,000
Teachers' College	500,000
Vassar College	400,000
Brown University	325,000
Seven small colleges	320,000
McMasters College	275,000
Rochester Theological Seminary	250,000
Cornell University	250,000
Bryn Mawr College	250,000
Case School of Science, Cleveland	200,000
Oberlin College	200,000
Spelman Seminary, Atlanta	180,000
Newton Theological Seminary	150,000
Meharry Medical College	150,000
Adelphi College	125,000
University of Wooster, Ohio	125,000
Children's Seaside Home	125,000
Presbyterian work in Egypt and the Sudan	100,000
Cleveland Social Settlement	100,000
Syracuse University	100,000
Smith College	100,000
Wellesley College	100,000
Curry memorial	100,000
Dennison College	100,000
Furman University	100,000
Lincoln memorial fund	100,000
University of Virginia	100,000
Cleveland Y. W. C. A.	100,000
University of Nebraska	100,000
Arcadia University	100,000
Indiana University	50,000
Mount Holyoke College	50,000
Shurtleff College	35,000
School of Applied Design for Women	25,000
Bucknell University	25,000
William Jewell Institute	25,000
Howard College	25,000
Miscellaneous gifts to 1920	500,000,000

Rockford, a rapidly growing city in Illinois, eighty-seven miles northwest of Chicago, on the Rock River. It is pleasantly situated on both banks of the river, which is crossed by five bridges and has artesian water, an excellent street car system, and a number of handsome public buildings. There are two hospitals, and a large Carnegie library containing a museum. Rockford College for Women, one of the best in the Central West, is located there. Two sanitariums are situated near the city. Manufacturing is the chief industry, the water-power being furnished by the river. The products include furniture, tools, lathes, saws, foundry products, farm machinery, gas stoves, watches, silverware, harness, mirrors, plate glass, hosiery, clothing, woolens, and pianos. The population in 1920 was 65,651.

Rocking-Stone, a rock resting on a rounded base so nicely that it may be rocked to and fro. Such stones are most apt to be found in a granite country. They are formed usually by the weathering away of the lower edges of a block in such a manner that the base becomes small and rounded. Sometimes they are stranded boulders brought down by a glacier and left on a table of rock when the ice receded. Rocking stones occur in all countries. The best known are in Great Britain and Ireland. One near Land's End, Cornwall, is computed to weigh seventy tons; yet it is easily set rocking by a single person. One on the island of Magee, Ireland, was believed by the peasantry to begin rocking gently on the approach of a person guilty of grievous crime. One in Argentina weighs, it is said, over 700 tons; yet it is poised so lightly that it rocks in a heavy wind. Yankee boys crack nuts under the

Rock Island, Ill., a manufacturing city and the county seat of Rock Island County, is situated at the junction of the Mississippi and Rock rivers, opposite Davenport, Iowa. and on four railroads. The city was named for a large island in the river here, known usually as Rock Island, though sometimes called Government Island.

The city has splendid water power for its manufacturing plants, the chief products of which are traction engines, canvas footwear, clothing, plows, paint, oilcloth, bricks, gas engines, warm air registers, stoves, storage batteries, plumbing specialities, sashes, doors and blinds.

It contains the Augustana College, the Visitation Academy, public, parish and private schools and fine libraries.

Rock Island was settled in 1826 by Col. George Davenport, though it was the site of Fort Armstrong in 1816. In 1920 the population was 35,177.

Rockland, Ontario, is on the Ottawa River and on the Canadian Northern and Grand Trunk railroads, 22 miles east of Ottawa. This city is primarily a summer resort, but it also has some manufacturing and commercial interests. The principal manufacturing establishments are a mica factory, lumber and planing mills, machine shop and sash and door factory.

The Rockland and the Atlantic are the two largest tourist hotels; the schools number three and include a high school; and the city has a library, a park and three churches. In 1921 the population was 3,496.

Rock Salt. See SALT.

Rocky Mount, N. C., is on the line that separates Edgecombe from Nash counties, and on the Tar River and the Atlantic Coast Line Railroad, 68 miles northeast of Raleigh and 121 miles south of Richmond, Va. This city is an important cotton and tobacco market, and the manufactories include tobacco factories, cotton mills, lumber mills, hosiery mills and the machine and repair shops of the Atlantic Coast Line.

Rocky Mount has a Federal building, high school, business college, library, parks and three hospitals. The city was incorporated in 1855, and in 1920 had a population of 12,742.

Rocky Mountains, the predominant mountain system of North America. It corresponds to the Andes of South America. In its widest application, the Rocky Mountain system includes the entire mountainous region of the West, extending from Alaska to Central America. Ordinarily, however, the Coast Range, the Cascades, the Sierra Nevada and the Cordilleras of Mexico are excluded. In the narrower use of the word, the Rocky Mountain range extends from the high land between the Yukon and the Mackenzie River to the Rio Grande. It traverses western Canada, Colorado, Idaho, Montana, Wyoming, Utah, and New Mexico. Subordinate ranges are known locally as the Coeur d'Alene, Bitter Root, Salmon River, Big Horn, Crazy, Shoshone, Wahsatch, Medicine Bow, Sawatch, and Elk Mountains. The most easterly spur is known as the Black Hills. The Rocky Mountains may be said to stand on a plateau about 4,000 feet in elevation. The chief passes are about 6,000 feet in altitude. The principal peaks are Pike's Peak, Long's Peak, Gray's Peak, Mount Harvard, Mountain of the Holy Cross, Uncompahgre and Blanca Peak, all over 14,000 feet in height. The sources of the Saskatchewan, the Missouri, Platte, Arkansas, Rio Grande, Columbia, and Colorado are in the Rocky Mountains. For an account of the storehouses of minerals, the parks and defiles and mountain scenery, the reader is referred to the separate articles on the states, rivers, and cities of this region.

Rodents, the order of gnawing animals. It includes the tree squirrels, chipmunks, ground squirrels, flying squirrels, prairie dogs, woodchucks, beavers, mice, rats, muskrats, lemmings, moles, jumping mice, pocket gophers, porcupines, hares, and rabbits. There are in all about 371 species of rodents. Of these, about 170 are found in North America. A rodent may be known by its front teeth. They have the shape of chisels and are designed to cut vegetable substances, gnaw shells of nuts, etc. The front portion of the tooth, or cutting edge, consists of the hardest enamel; the rear is softer and wears away more rapidly, leaving the front edge keen and sharp. The tooth grows as fast as it wears off. Many animals that resemble the rodents in appearance belong to other orders. The bats, for instance, look like mice; but they are not rodents. They have sharp teeth, instead, suited for eating insects and fruit. Moles and shrews also have sharp teeth. They are insect eaters, not rodents. A similar remark applies to the hedgehog of Europe. A systematic notion of American rodents may be had from the special articles on SQUIRRELS; CHIPMUNK; GROUND SQUIRREL; BEAVER; MOUSE; RAT; POCKET GOPHER; PORCUPINE; HARE; RABBIT. See also PRAIRIE DOG; WOODCHUCK; FLYING SQUIRREL.

Roderick Dhu, rŏd'er-ik dū, one of the principal characters in Scott's *Lady of the Lake*. See LADY OF THE LAKE.

Rodin, Auguste (1840-1917), the

Chimney Rock, Yellowstone
Forest Reserve, Wyoming

Falls of the Big Thompson
Estes Park, Colorado

ROCKY MOUNTAIN SCENES

Old Faithful

Giant Geyser

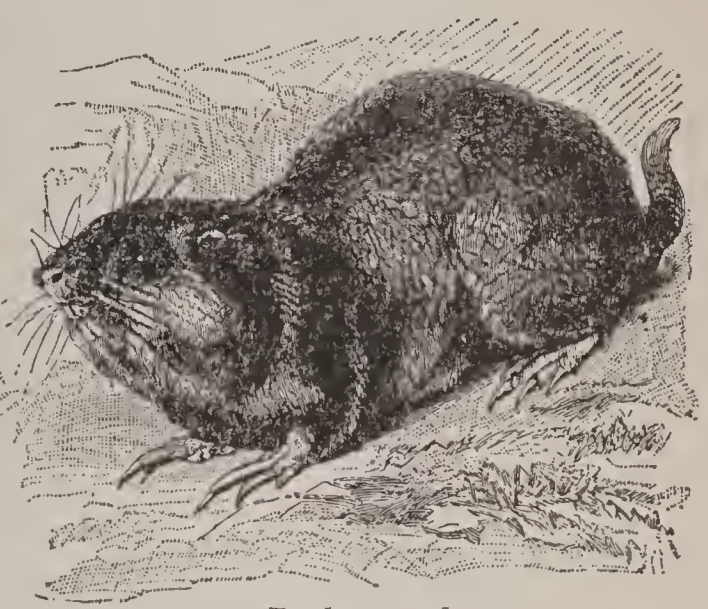
Black Growler Geyser

GEYSERS IN YELLOWSTONE PARK

Viscacha or South American prairie dog.

Coypu or South American muskrat.

Chinchilla.



Pocket gopher.

Beaver.

greatest French sculptor of the modern school, was born in Paris. His general education he received before he was 14, at which age he began the study of art. At the age of 22, M. Rodin produced one of his strongest pieces of work, a head entitled *Broken Nose.* Already he had arrived at a working theory, which was that only the characterless in art is ugly, and that nature should be the artist's only guide. By this rule he always worked. M. Rodin had a perfect knowledge of anatomy, his technical skill was remarkable, and he worked with equal facility on miniatures and on figures of colossal proportions. A notable feature of his later work was a quality of impressionism, his leaving his work in the block from which it was chiselled as soon as expression had been attained. M. Rodin served in the National Guard during the Franco-German War, and studied in Brussels for several years after 1870. In 1877 he exhibited his daringly realistic *Age of Bronze* at the Paris Salon. This was followed by *St. John Preaching, The Thinker, Adam and Eve, The Kiss, Daniel,* the *Bather, Cupid and Psyche, The Hand of God,* and many others. M. Rodin's studio was converted into a day nursery in 1914 after the opening of the World War, and the sculptor was forced to go to England to find a quiet place to work.

Roe, Edward Payson (1838-1888), an American clergyman and novelist. He was born in Orange County, New York, completing his studies he was ordained as minister and was chaplain of the Second New York Volunteers in 1862. He became pastor of a Presbyterian church at Highland Falls, New York, but resigned his pastorate in 1874 and removed to Cornwall-on-the-Hudson, where he undertook fruit cultivation and devoted himself to literary pursuits. His novels possess no literary distinction, but they have been very popular. His best-known works are: *Barriers Burned Away, From Jest to Earnest, Opening a Chestnut Burr, A Knight of the Nineteenth Century, He Fell in Love With His Wife,* and *Driven Back to Eden.*

Roentgen Rays. See X-Rays.

Rogers, John (1829-1904), an American sculptor. He was born in Salem, Massachusetts, and was educated in Boston, Rome, and Paris. He modeled a statuette, *The Checker Players,* in 1859, which attracted notice. His *Picket Guard* was followed by several Civil War pieces, popularly known as "Rogers' Groups." *The Slave Auction* and *Going for the Cows* are among the best known. Later he executed a series illustrating Irving's characters and scenes. His equestrian statue of General John F. Reynolds now fronts the city hall in Philadelphia.

Rogers, Randolph (1825-1892), an American sculptor. He was born in Waterloo, New York, and after being engaged in mercantile business in Ann Arbor, Michigan, for a few years, he went to Rome to study art. He returned to America, and his statues of *Nydia, The Blind Girl of Pompeii,* and of *President John Adams* brought him early fame. He lived in Rome from 1855 until his death. He modeled the bronze doors for the east entrance to the capitol at Washington. He executed several memorial monuments and among his statues examples of his work are those of Lewis, Nelson, Seward and Lincoln.

Rogers, Robert (1864-), a Canadian statesman, was born at Lakefield, Quebec, and was educated at Lachute Academy and in Montreal. In 1881 Mr. Rogers removed to the Canadian Northwest and there acquired wealth as a grain merchant and in the promotion of large-scale industrial enterprises. He entered the political field, and in 1891 was elected president of the Manitoba Conservative Convention. In 1886 and again in 1892 he stood unsuccessfully for the Manitoba legislature; and in 1896 failed of election to the Dominion House of Commons. In 1899, however, he was elected to the Manitoba legislature, and was reelected three times. From 1900 to 1911 he was provincial minister of public works, and acted as premier for a few months in 1911. Also in 1911 Mr. Rogers was made Dominion Minister of the Interior and was elected to the House of Commons for Winnipeg. In 1912 he was appointed Dominion Minister of Public Works.

Roland, Manon Jeanne Philipon (1754-1793), the wife of Jean Marie Roland, the French patriot. As a child she exhibited extraordinary precocity, with

interests far beyond her years. She was a disciple of Rousseau, and a revolutionist at heart. Her home became the meeting place for the coterie of brilliant young leaders of the Gironde, and even Robespierre himself. Roland was arrested in May, 1793, Madame Roland was arrested in June and was guillotined on November 9 of the same year. Her famous *Memoirs* were completed during the months that she was in prison. As she was brought to the guillotine she is said to have looked up at the statue of liberty and exclaimed: "O Liberty, what crimes are committed in thy name!" Hers was the death of a martyr, and her husband took his own life a week later, overcome by the hopelessness and misery around him.

Roland, a famous paladin of Charlemagne. In the cycle of romances of that age, Roland is one of the knightly champions who accompanied Charlemagne to war. According to tradition, as preserved in song and story, he possessed a wonderful sword won from a giant in single combat, and a marvelous horn called Olivant which might be heard for twenty miles. According to one story told of him, he fought once for five days with Oliver, Duke of Genoa, one of his companions. They were so evenly matched in arms that neither was able to gain advantage, whence the phrase, "to give a Roland for an Oliver." The story of his death is the following: He accompanied Charlemagne on an unsuccessful military expedition into Spain. As the army withdrew Roland was left to guard the retreat with a force of 20,000 men. The pagans fell upon him with great force in the narrow valley of Roncesvalles. Roland might have sounded his horn to call help from Charlemagne, but he scorned to do so. He fought on until 100,000 Saracens lay dead and only 50 of his own warriors remained alive. He then blew his horn for help; but Charlemagne, persuaded that Roland was only hunting the deer, remained inactive until it was too late. Roland blew until the veins in his neck burst. He then dragged himself to the foot of a cliff, where he sang his death song, threw his magic sword into a stream, and died from his many wounds. From this engagement the vale has been called the "Thermopylae of the Pyrenees." Charlemagne was greatly incensed to lose his favorite warrior and avenged his death in many bloody conflicts with the Saracens. The song of Roland was a famous war cry among the French. It was chanted by William of Normandy's men as they advanced to battle against Harold at the battle of Hastings in 1066. In his description of Flodden Field in *Marmion,* Walter Scott refers to Roland and his magic horn:

> Oh! for the blast of that dread horn,
> On Fontarabian echoes borne,
> That to King Charles did come,
> When Rowland brave, and Olivier,
> And every paladin and peer,
> On Roncesvalles died!

See CHANSON DE ROLAND.

Roller-Skate, a skate patented in France in 1819, and used in England and America since about 1864. Mr. Plimpton of New York invented a device which geared the two pairs of wheels together in such a manner that they cramped when the foot plate was turned. By this means the skater was enabled to move on a curved line, and with this improvement the roller skate became highly popular. The skate in general use has four wheels. Another kind with two wheels, set one behind the other, has more recently been adopted for expert performances of roller-skating. The rinking craze has appeared at intervals in the United States; within the last few years it has been particularly popular with the young, who utilize the cement walks in the cities for this pastime.

Rollin, Charles (1661-1741), a French historian. He was a native of Paris. His father was a cutler. He received a liberal education and held several important educational positions, including the rectorship of the University of Paris. He was noted for his eloquence and for the advocacy of classical studies, particularly Greek. He is known best as the author of an *Ancient History* which appeared in Paris in 1730-1738 in twelve volumes. It is a compendium of the antiquities, military events, literature, and dynasties of the ancient nations. It was written in an attractive style and was prodigiously popular. It was translated into many foreign languages. Frederick the Great wrote the author a personal letter complimenting him on his interesting

style. Though now regarded as a rather youthful production, and necessarily inaccurate as to facts, the *Ancient History* is still good reading. The chapters on the early agriculture and antiquities of Egypt are particularly interesting.

Rollo. See ABBOT, JACOB.

Roman de la Rose, rō-mon'de lä rōz, or Romance of the Rose, an early French allegorical poem. It was begun by Guillaume de Lorris about the middle of the thirteenth century. He wrote about 4,000 lines. Early in the fourteenth century Jean de Meung continued the work.

Roman Literature. See LITERATURE.

Romance. See FICTION.

Romance Languages. See LANGUAGE.

Romans, Epistle to the, one of the books of the New Testament, written by the Apostle Paul, and addressed to the Christian Church at Corinth. It is the longest and most extensive of St. Paul's epistles and is thought to have been written in 55 or 56, when the Apostle had completed his third missionary journey, and while he was on a visit to Corinth. It was sent to Rome by Phoebe, a deaconess of the Church at Corinth. The Church at Rome was composed of both converted Jews and Gentiles, and the former sought to impose upon their Gentile co-worshipers some of their Mosaic rites. The Gentiles disliked the prejudices of the Jews, so there was constant friction among them. It is thought that these contentions called forth the admonitions contained in this epistle. That the Apostle Paul was the author of the Epistle to the Romans has received universal recognition.

Romanticism. See REALISM.

Rome, the capital of Italy. The most celebrated city in the world. It is situated on both banks of the Tiber, about fifteen miles from the Mediterranean. It was built originally on seven hills and their connecting valleys. These hills are known in history as the Capitoline, Palatine, Aventine, Caelian, Viminal, Esquiline, and Quirinal. The actual origin of the city is lost in antiquity. According to tradition it was founded by Romulus, 753 B. C. According to the same authority the government was monarchial up to 509, when a republic was established. An imperial form of government was established 27 B. C. The history of the first centuries of the republic are also matters of conjecture. During the fifth and fourth centuries B. C. Rome was engaged in struggles with surrounding tribes, notably the Volscians, Etruscans, and Samnites, the result of which was the final Roman domination of all Italy. The history of Rome was one of western expansion up to the reign of Trajan, 98-117 A. D. The empire was then at its greatest extent. It included the civilized world, embracing not only Italy, but southern Europe, northern Africa, and western Asia. At this period the population of the city itself is variously estimated at from 1,500,000 to 2,500,000 people. Christianity became the official religion of the empire about 323 A. D. The capital was transferred from Rome to Constantinople in 330. The Roman world was divided into the eastern and western empire in 395. The capital of the western empire was removed from Rome to Ravenna in 402. The western empire suffered attacks from the Franks, Vandals, Burgundians, Angles, and Saxons.

In one sense of the word Rome is a vast museum of archaeology. Extensive excavations have been made recently. Literally mountains of rubbish have been removed from the city. The temples, basilicas, palaces, baths, and public places of ancient Rome may be studied now to advantage. Some are in a good state of repair. Of others but traces remain. Many of the triumphal arches and columns are practically uninjured. A countless number of marble and bronze statues, coins, vases, and other objects of art have been arranged in museums and other places for safe keeping. Much has been done. Much remains to be done. The work of excavating has been prosecuted by the Italian government under the intelligent supervision of Professor Lanciani, professor of archaeology in the University of Rome. His *Ancient Rome in the Light of Recent Discoveries,* published in 1888, should be in every school library. An association of American universities maintains a school of archaeology at Rome.

Rome, "The Eternal City," is by no

means wholly of the past. Today it is the capital of a united Italy; but the evidences of its past are so numerous on every hand that its modernity is almost lost. It is surrounded by a wall of brick, fifteen miles in circumference, and is divided by the Tiber into two unequal parts. The wall was built almost entirely by Aurelian and dates from the year 275. As a means of defense it is valueless, but a circle of detached forts outside the wall protects the modern city. Monuments, gates, arches, statues, parks—ancient and modern—adorn the city. The Tiber now flows between banks that have been strengthened by masonry, and on the Palatine Hill is now a public park.

Rome is divided into four sections. Of these the largest is the Campus Martius, on the left bank of the ten-bridged river and in the northern part of the city. In the south and on the left bank is the largest ancient section; on the northeast and north and also on the left bank is the most modern section. On the right bank of the Tiber is a populous part of Rome, centered around the Vatican and St. Peters. The streets of the city have in many instances been widened and lighted, and the poor districts have been made more airy and sanitary than they were at the close of the nineteenth century. The Palatine Hill is partly a park and partly a mass of ruins, ruins also crown the Caelian and Aventine hills. The royal palace and some of the principal government buildings are on the Quirinal; the Capitol, of Michelangelo's designing, stands on the Capitoline Hill; while grimy industrial sections clutter the Virminal and Esquiline hills.

Highly attractive edifices, besides those already mentioned, are Piazzi de Venezia, the Pantheon, Palace Napoleon, Palace Forlonia, Palace della Cancelleria, Gesù (the Jesuit church), Farnese Palace, Palace of the Conservatori, Palace Borghese, Villi Medici and a number of museums, libraries and less important churches.

For centuries the land immediately surrounding the city was a swampy, pestilential waste, kept wet the year round by the overflow of the Tiber. But the river is now confined within its banks and the greater part of the land has been drained and turned into gardens and small farms. But even yet a large part of the city's food is brought from other parts of Italy and the world. Its trade life is unimportant, and the only important industrial products are a variety of art objects, artificial pearls and flowers and a few other articles.

For some centuries after the rise of the Byzantine Empire and the fall of Rome, the latter was but a Byzantine dependency. The Pope was driven out in 1848 but returned in the following year under French protection. Until 1870 he ruled Rome, but in 1871 Italy was united, the king occupied the Quirinal and the Pope was forced into a kind of imprisonment in the Vatican.

Rome is not as important as an art center as it once was, and its commercial and industrial interests are of minor importance and likely so to remain. But it will always be "The Eternal City." Population, 590,960.

Rome, Ga., a manufacturing city and the county seat of Floyd County, is situated at the confluence of the Etowah and the Costanaula rivers, and on four railroads, 72 miles northwest of Atlanta. It is in an agricultural region that produces cotton, poultry, dairy products, grain, hay and fruit in abundance. Its principal manufactures are cotton goods, hosiery, stoves, furniture, plows, scales, sewer pipe, bricks, mattresses and machine shop products.

Notable features of the city are the eight iron and concrete bridges that span the rivers, the post office building, the new municipal building, the Broad Street monuments, De Soto Park, and the beautiful Myrtle Hill cemetery. It contains the Shorter College for Women, the Darlington School for Boys, the famous Berry Schools for mountain boys and girls, a splendid public school system and a Carnegie library. Rome was occupied by General Sherman for a short time during his Georgia campaign. Population in 1920, 13,252.

Rome, N. Y., a manufacturing city and one of the county seats of Oneida County, is situated at the junction of the Barge, Black River and Erie canals, and on the New York Central and the New York, Ontario & Western railroads. It is at the head of the fertile Mohawk Valley, 15 miles north-

west of Utica, on a plateau about 450 feet above sea level. Rome was founded in 1760 on the site of Fort Stanwix, built by the English in 1758. This fort was a battle center during the War of the Revolution, and it was near here that the enemy, in 1777, first saw unfurled the Stars and Stripes.

The most important of Rome's many manufactures are copper and brass ware, wire, automobile radiators, fire bricks, metal bedsteads, locomotive repairs, knit goods, cans and electrical supplies.

It has the Academy of the Holy Names, the Central New York Institution for Deaf Mutes, Rome State School for Mental Defectives, a number of private schools, fine public schools and the Jervis Library. In 1920 the population was 26,341.

Romeo and Juliet, a tragedy by William Shakespeare. It was first published surreptitiously in 1597, and had been written probably several years before, perhaps as early as 1591. The story is of two noble Italian families, the Capulets and Montagues, who

> From ancient grudge break to new mutiny.

Juliet, the daughter of Capulet, and Romeo, son of Montague, meet and fall in love. Their secret marriage, the command of Juliet's parents that she wed another, her plot to escape, the tragic death of both lovers leading to the reconciliation of the two families, are the events which follow one another in rapid succession. The plot has been used by many authors and playwrights and has been chosen often for operatic purposes. Shakespeare's version, however, is and will remain the most celebrated.

Romola, a historical novel by George Eliot, published serially in the *Cornhill Magazine,* 1862-1863, and in book form in 1864. The *Cornhill Magazine* paid £7,000, more than $33,000, for the first right of publication. By many *Romola* is considered George Eliot's greatest novel. It is unquestionably the greatest of those for which she made special study. The earlier novels, which are earnest and truthful delineations of English life in Warwickshire, are of so different a type that it is hardly possible to compare them with *Romola.* Without doubt, *Romola* ranks among the greatest historical novels in the English language. It is a picture of Florentine life during the fifteenth century, when the city was stirred by the teachings of Savonarola.

Romulus, rŏm′ū-lŭs, in mythology, the first king of Rome. According to tradition, he was the son of Mars and the vestal virgin, Rhea Silvia. On the birth of Romulus and his twin brother Remus, the king ordered the vestal virgin to be executed and the twins thrown into the Tiber. The boys were placed in a cradle and set afloat. Instead of overturning, however, it floated to the roots of a wild fig tree, where it rested after the subsidence of the waters, leaving the twins on dry land. They were suckled and brought up by a she-wolf, until they were found by a shepherd who took them to his wife. On growing up, the secret of their birth was discovered and they together inherited the throne of their grandfather, Numitor. Romulus founded Rome in 753 B. C. He was worshiped as a divinity under the name of Quirinus.

Röntgen. See X-Rays.

Roof, the covering of a building. In form roofs are flat or sloping. In hot climates where they are used at times for domestic purposes the roofs are made flat, and are covered with tar, metal, concrete, or cement. Hence the roofs are flat in Persia and Arabia, while in Greece they slope at an angle of about sixteen degrees, in Rome at an angle of twenty-four degrees. The flat roof has yielded to the sloping roof as the design of buildings has grown more and more ornamental, but for convenience and economy the flat structure has been retained in modern business buildings. The roofs are designated by their shapes, as flat, gable, pavilion, hip, curb, shed, or ogee.

Rook. See Crow.

Roosevelt, rō′z velt, **Theodore** (1858-1919), the twenty-fifth president of the United States. He was born in New York City, October 27, a descendant of a good old Dutch Knickerbocker stock, with an admixture of Irish and Huguenot ancestry. As a child he was considered rather delicate in health. He was educated at home rather than at school. He developed into an active, affectionate, adventurous boy, ready to fight or to make up, according to circum-

stances. At Harvard, he was known as a reader, a thinker, and a talker. He took an active interest in athletics. In 1880, after graduation, he spent a few months in Europe. He climbed the Jungfrau and the Matterhorn, and was elected a member of the Alpine Club. On his return home, he took an active interest in local politics. In 1882 he was elected to the legislature of New York, and, although the youngest man in the body, he became the recognized leader of the Republican minority.

While still a young man, he went West, partly for his health, partly for love of adventure. He bought an interest in a large ranch on the banks of the Little Missouri, near Medora, in the Bad Lands of North Dakota. He stayed in a log house for several years, living the life of a cowboy, ranch owner, and sportsman. Here he gathered material for a number of books, including *Hunting Trips of a Ranchman, Ranch Life and the Hunting Trail, The Wilderness Hunter,* and *The Deer Family*. While this period of his life was no doubt of great benefit to the future president, it is to be regretted for the completeness of the story that he lost rather than made money in raising cattle. Returning to New York he was made a civil service commissioner in 1889, and in 1895 he was made president of the New York police board. His administration of these important offices may be described briefly as a systematic campaign against dishonesty in public office.

He was elected governor of the state of New York in 1898. In 1900 the Republicans nominated Roosevelt for the vice-presidency. He did not desire the nomination, but it was forced upon him by leaders who desired to get him out of the way. It was considered that a vice-president could not become a formidable candidate for the presidency. The tragic death of President McKinley at Buffalo elevated Roosevelt to the presidential chair. He took the oath of office September 14, 1901. In 1904 he was nominated for the presidency and was elected by the most overwhelming majority ever given a presidential candidate since the day of Washington.

While it is generally acknowledged that the term of Roosevelt's administration was an epoch-making period, few people agree as to what one feature was of greatest importance. The seven and a half years during which he was chief executive naturally divides itself into two periods: the first, the completion of McKinley's administration, during which time he felt himself bound to follow along the lines laid down by his predecessor; the second opens with his own election. With that election he entered definitely upon his own policy. While it is impossible to go into detail concerning the acts which made his administration noteworthy, a few of the most important may be mentioned. One of the things that Mr. Roosevelt preached incessantly, even before his election to the Presidency, was the elevation of business morality. The result of this has been seen in the awakening of a public conscience. He did much to abolish the *laissez faire* policy of the government, especially in relation to its control both of corporations and labor combinations. The act which aroused the world's wonder and incidentally won for him the Nobel peace prize, was his initiation of the peace movement between Russia and Japan. No one expected his advances to meet a favorable reception; experienced diplomats held their breath in wonder at his daring. Nevertheless he was successful, and the Treaty of Portsmouth is tangible evidence of that success. Along the same line it is of interest to remember that he became an intermediator between Germany and France, concerning Moroccan affairs, and thus led to the Algeciras agreement. He also, through treaties with various countries, extended the scope of The Hague Tribunal in matters touching the United States. In the conservation of natural resources, Mr. Roosevelt took a deep interest. Investigation showed that through fraud private interests were getting possession of public lands, particularly those rich in minerals, forests and mines. As a result of his work, great areas have been deeded back to the United States, and more have been withdrawn from entry, and movements were set on foot to conserve the forests and to prevent the water-powers of the nation from falling into the hands of a water syndicate. During his administration a new department, that of Commerce and Labor, was created, which gives the

government a means of exercising greater influence over matters pertaining to labor and capital. The Department of Agriculture was strengthened and developed, and the pure food agitation really rose to prominence during this time.

While many other things might be mentioned, one in particular ranks in importance with the Russo-Japanese peace, as a personal accomplishment, and that is the purchase of the Panama Canal, which brought to an end one of the questions that had perplexed the nations of the world. Considering the results following the completion of the Canal and its importance to international commerce and communication, there are not a few who rank his purchase of the Panama Canal as one of the most important of Mr. Roosevelt's acts.

In 1909 at the close of his term of office, Roosevelt allied himself with the forces of the Smithsonian Institution and went to Uganda, Africa, on a hunting and collecting trip. He wrote interesting accounts of his experience for *Scribner's Magazine.* On the return journey he lectured in Cairo, Copenhagen, Berlin, and Oxford. He was received more like a monarch than a plain American citizen and on landing in New York in June, 1910, he was accorded a welcome and a reception in point of spontaneity unequaled in American history.

Soon after his return, Colonel Roosevelt, by which title, gained in the Spanish-American War, he was commonly known, became associate editor of the *Outlook,* and the much mooted question as to what we should do with our ex-presidents seemed to be settling itself as far as the only living one was concerned. He took a somewhat active part in the New York State campaign of 1910, but otherwise seemed to have retired from politics. By the spring of 1912, however, it was apparent that he was out of sympathy with President Taft who was largely indebted to his predecessor for his elevation to that position. Roosevelt publicly took exception to the arbitration treaties urged by the administration as well as to its trust policy. Rumors became current of a desire on the part of the Colonel for a third term. The lines became clearly drawn between the so-called "insurgent" and "stand-pat" elements of the Republican Party; and as the time for the national convention approached, President Taft was slated for renomination by the conservative element of the party, while the progressives had several candidates, Senator La Follette of Wisconsin being especially prominent. There were without doubt a goodly number who would have liked to see Roosevelt enter the contest but he kept a sphinx-like silence till April when, at the solicitation of a delegation of governors he "threw his hat in the ring," and began a vigorous campaign for the nomination. In most of the states where preferential primaries were held, he won the delegates, but Taft held a working majority. There were many contested delegations and the national committee was in session for three weeks passing on these, with the Taft delegates being uniformly seated. Interest in the struggle became intense upon the assembling of the delegates in Chicago. Roosevelt journeyed thither also, and from his hotel directed his cohorts even on the floor of the convention. In the contest over the temporary organization the Taft forces were victorious. Attempts to seat contested delegations failed and at the close of a week of parliamentary maneuvers, Taft received the nomination.

Steps were immediately taken by the unsuccessful Roosevelt followers, under the leadership of the Colonel, to hold a new convention in August. This was done and a new party organized, the Progressive Party, familiarly called the "Bull Moose" Party, from the remark of the Ex-president upon his arrival in Chicago at the former convention that he felt "like a bull moose." The new party, with Roosevelt and Johnson as standard bearers, instituted a vigorous campaign, polled a popular vote in November of over four millions, and secured 77 electoral votes to 8 for the regular Republicans and 446 for the Democrats.

The family home is at Oyster Bay, Long Island. President Roosevelt's life was very different from that of Jackson, Lincoln, and other Americans who have been idealized. He came of a prominent family. He was born to comfort and had every possible opportunity for an education. Intellectually, and every other way, he could be called an unspoiled child of fortune. He had great opportunity and made the most

of it. Americans recognize in him a fine type of manhood. He was wealthy, but not covetous; thrifty, but without greed; and generous, without being wasteful. As a public man, he was kindly, but not credulous; alert, not suspicious; and ambitious, but not envious. He had unbounded courage, tempered by shrewdness; he was bullet-headed, but not unreasonable. Finally, in the eye of the people, he stood for a strenuous life, for publicity, and for a square deal. He died at his home January 6, 1919.

In his proclamation announcing Roosevelt's death, President Wilson paid him the following tribute:

"It becomes my sad duty to announce officially the death of Theodore Roosevelt, President of the United States from September 14, 1901, to March 4, 1909, which occurred at his home at Sagamore Hill, Oyster Bay, N. Y., at 4:15 o'clock in the morning of January 6, 1919. In his death the United States has lost one of its most distinguished and patriotic citizens, who had endeared himself to the people by his strenuous devotion to their interests and to the public interests of his country.

As president of the police board of his native city, as member of the legislature and governor of his state, as Civil Service Commissioner, as Assistant Secretary of the Navy, as Vice-President and as President of the United States, he displayed administrative powers of a signal order and conducted the affairs of these various offices with a concentration of effort and a watchful care which permitted no divergence from the line of duty he had definitely set for himself.

In the war with Spain he displayed singular initiative and energy, and distinguished himself among the commanders of the army in the field. As President he awoke the nation to the dangers of private control which lurked in our financial and industrial systems. It was by thus arresting the attention and stimulating the purpose of the country that he opened the way for necessary and beneficent reforms.

His private life was characterized by a simplicity, a virtue and an affection worthy of all admiration and emulation by the people of America."

QUOTATIONS.

The people that do harm in the end are not the wrong-doers whom all execrate; they are the men who do not do quite as much wrong, but who are applauded instead of being execrated. The career of Benedict Arnold has done us no harm as a nation because of the universal horror it inspired. . . . The conscienceless stock speculator who acquires wealth by swindling his fellows, by debauching judges and corrupting legislatures, and who ends his days with the reputation of being among the richest men in America, exerts over the minds of the rising generation an influence worse than that of the average murderer or bandit, because his career is even more dazzling in its success, and even more dangerous in its effects upon the community.

The prime thing that every man who takes an interest in politics should remember is that he must act, and not merely criticise the actions of others. It is not the man who sits by his fireside reading his evening paper, and saying how bad our politics and politicians are, who will ever do anything to save us; it is the man who goes out into the rough hurly-burly of the caucus, the primary, and the political meeting, and there faces his fellows on equal terms.

Teach the boy that he is to be expected to earn his own livelihood; that it is a shame and scandal for him not to be self-dependent, not to be able to hold his own in the rough work of actual life. Teach the girl that so far from its being her duty to try to avoid all labor, all effort, that it should be a matter of pride to her to be as good a housewife as her mother was before her.

I want to see our education directed more and more toward training boys and girls back to the farm and the shop, so that they will be first-rate farmers, first-rate merchants, fit to work with the head and to work with the hands; and realizing that work with the hands is just as honorable as work with the head.

Root, Elihu (1845-), an American lawyer and statesman. He was born in Clinton, New York, and was graduated from Hamilton College in 1864, and from the New York University Law School in 1867. He soon became locally known as a successful lawyer, and in 1899 succeeded Russell A. Alger as secretary of war. President Roosevelt appointed him to the position of secretary of state in 1905, his former portfolio being given to William H. Taft. In July, 1906, he distinguished himself in the Pan-American Congress in Rio de Janeiro, where he represented the United States. He was president of the New York City Bar Association from 1904 to 1905, and was made president of the American Society of International Law in 1906. In November of the same year he

was made one of the representatives of the United States in the Permanent Court of Arbitration. During his term of office as secretary of war, he brought about many permanent reforms, chief of which were a system of promotion based on merit and not on seniority, the creation of the general staff, and the union of militia and the regular army. Later he was successful in his efforts to prepare Cuba for independent government, also to bring order into Philippine affairs and to hasten their preparation for civil government. He was the recipient of the Nobel Peace Prize for 1912.

Root, George Frederick (1820-1895), an American musician and composer, whose patriotic songs attained very wide popularity. He was born at Sheffield, Mass., studied music in Boston, and removed to New York City, where in 1844-45 he taught music. In the latter city he was also for some years the organist in the Church of the Strangers. Mr. Root removed to Chicago in 1859, where he established the music publishing firm of Root and Cady. After the opening of the Civil War, Mr. Root won fame and fortune with patriotic songs, the best of which he composed. The most noteworthy of these were *The Battle Cry of Freedom*, *Just Before the Battle*, *Mother* and *Tramp, Tramp, Tramp, The Boys are Marching.* Another song composed by Mr. Root that won popularity was the quartette, *There's Music in the Air.* Notable among his compositions of greater merit were the cantatas *Belshazzar's Feast*, *The Flower Queen* and *The Pilgrim Fathers.*

Rope, a thick cord, especially a cord over one inch in circumference. Ropes are made of various vegetable fibers, including hemp, flax, cotton, manila or coir; also of iron, steel or other metallic wire. A typical rope of hemp is composed of a certain number of yarns or threads, which are first spun or twisted into strands. The finished ropes are specially named according to the number and arrangement of the strands, and the various sizes are indicated by the circumference in inches. The ropes in ordinary use on shipboard are composed of three strands, laid right-handed, or "with the sun," as it is called, though this does not apply correctly in southern latitudes. Larger ropes may be laid up in four strands, also "with the sun," and such ropes are generally used for standing rigging, tacks, sheets, etc. They are sometimes called "shroud-laid," from being used for the shrouds in standing rigging. In the language of seamen a rope is usually called a "line."

Cable-laid rope is a rope composed of nine strands. It is made by first laying the strands into three ropes of three strands each, right-handed; and then laying up the three ropes together into one, left-handed. Thus cable-laid rope is like three small common ropes laid up into one large one. Formerly the ordinary three-stranded right hand rope was called hawser-laid and the nine-stranded cable-laid, but they are not now so distinguished among seafaring men. The terms hawser-laid and cable-laid are applied indiscriminately to nine-stranded rope, while three-stranded or common rope, is called right hand rope. Manila rope is made from Manila hemp.

Wire rope is a collection of wires of iron, steel, etc., twisted or sometimes bound together, so as to act in unison in resisting a strain. Wire ropes or cables are extensively used in elevators and other raising and lowering apparatus, as standing-rigging for ships, as substitutes for chains in suspension bridges, for telegraph-cables, and many other purposes.

Rosario, Argentina, the second city of the republic, is situated in the northwestern part of Argentina on the Parana River, 175 miles northwest of Buenos Ayres and in the southern part of the province of Santa Fe. The city is well built with wide streets, parks, beautiful homes and a modern electric street-railway system. The leading industrial plants include flour mills, sugar refineries, breweries and other manufactories. Rosario is an important railway center and river port and carries on an extensive export and import trade. The docks, wharves and warehouses are modern and are equipped with the latest devices for handling freight. The courthouse covers an entire city square. The public school buildings, a cathedral and a number of handsome business blocks are all noteworthy structures. Population 1921, 250,000.

Rose, a thorny, flowering shrub, giving name to a large family, including many orchard and garden fruits. Wild roses have five petals, numerous stamens, and numerous pistils, one for each of the seeds, finally enclosed in the fleshy rose hip or calyx. A rose hip (it should never be called a rosebud, which is an unopened flower) is the very opposite of its cousin, the strawberry. If the end of the strawberry were pushed inward like the end of the finger of a glove until the naked seeds of the strawberry were on the inside instead of the outside, we should have the rose-hip style of fruiting. Or if the inside of the rose hip were to swell out and upward, as a boy pulls his pocket inside out, the rose hip would be constructed then on the plan of a strawberry. All wild roses are single.

Various classifications of the cultivated roses have been made. Gardeners recognize over fifty desirable species. Florists group roses into, first of all, summer flowering roses that bloom once each season, and perpetual roses that bloom the year around if conditions permit; and these again are divided in Bailey's monumental Cyclopedia into nineteen classes, which we can take space only to name: Provence, damask, and French, alba (white), Ayrshire, briers, multiflora (many-flowered), evergreen, and pompon are summer flowering groups. The perpetuals include hybrid perpetuals, hybrid tea, moss, Bourbon, Bourbon perpetual, China, musk, Ayrshire, polyantha, perpetual briers, and evergreen groups. Eglantine or sweet brier is a wild hedge rose.

The rose is by common consent the queen of flowers. Wild or tame, its beauty cannot be gainsaid. Whatever his favorite flower may be, everyone is fond of the rose. In English history the white rose was the badge of York, and the red rose that of Lancaster. Edward III impressed a rose on his coinage of gold. The rose and the rosette had their place in architecture. The "Last Rose of Summer" voices regret for pleasures nearly over. An allusion to the rose, if delicately made, is particularly appropriate to feminine beauty, as when Byron says:

> And her face so fair
> Stirred with her dream, as rose leaves with the air.

Tennyson calls his Princess,

> A rosebud set with little wilful thorns,
> As sweet as English air could make her.

and his Maud,

> Queen rose of the rosebud garden of girls.

The value of good associations is suggested well in the line:

> I am not a rose, but I have lived near the rose.

"Let us crown ourselves with rosebuds before they be withered," a grave bit of advice from the wisdom of Solomon, points out the propriety of appreciating our opportunities before it is too late. Shakespeare may be right in saying, "That which we call a rose, by any other name would smell as sweet," but certainly to substitute a new word would be a serious loss to our literature.

See ATTAR; PERFUME; OIL.

Rosebery, Archibald Philip Primrose, Earl of (1847-), an English statesman. He was born in London and studied at Eton and Oxford. He succeeded to the title of Earl of Rosebery in 1868 upon the death of his grandfather. In 1874 he was elected president of the Social Science Congress in Glasgow; twelve years later he was appointed secretary of state for foreign affairs in Gladstone's government. When Gladstone retired in 1894, Lord Rosebery succeeded him as prime minister, but he remained in the position for only a short time, due to a defeat in the committee on army estimates. He later led the Liberal opposition but relinquished his leadership in 1896. He became lord rector of Glasgow University in 1899. Lord Rosebery is known principally as an orator of distinct literary attainments, a Liberal in politics, and a man of extensive reading and broad interest, both in the reform of the House of Lords and in the betterment of the social life among the masses. He has published the following books: *Life of William Pitt, Life of Sir Robert Peel,* and *Napoleon: The Last Phase.*

Rosecrans, William Starke (1819-98), an American general. He was born in Kingston, Ohio, was graduated from West Point, became a civil engineer, and served as brigadier-general in the Civil War. He served under General McClellan in the West Virginia campaigns, and when placed in command of the Army of the Mississippi,

he made a successful defense of Corinth in western Tennessee. He commanded the Army of the Cumberland and won the battle of Murfreesboro, but met his defeat at Chickamauga, September 19-20, 1863, and suffered a loss of 16,000 men. The following year he defended Missouri against an invasion by Price, and the same year he was relieved of his duties and resigned from the army. He lived in Cincinnati for four years. He was appointed minister to Mexico in 1868 and represented California in Congress from 1881-5. Subsequently he became register of the United States treasury for seven years, and was restored to the rank of brigadier-general on the retired list before his death.

Rosemary, a plant of the mint family, native to the countries of the Mediterranean. It has a fragrant smell and a bitter, pungent taste. An oil obtained from its leaves by distillation is much used as a perfume in the manufacture of pomatums for the hair. Rosemary is a possible corruption of an original name signifying dew of the sea.

> There's rosemary, that's for remembrance; . . and there is pansies, that's for thoughts.—Shakespeare, *Hamlet.*

Rosetta Stone, rō-zĕt'ta stōn, a slab of black basalt. It was discovered in 1799 near Rosetta, Egypt, by a French engineer of Napoleon's army, who was engaged in excavating the foundation of a fortification. Three years later it was secured by the British Museum, and became the subject of study. It is about three and one-half feet long and two and one-half feet wide and a foot thick. It bears parallel inscriptions in three languages—hieroglyphic, demotic characters, and Greek. For centuries, scholars had been striving to read the hieroglyphics of Egypt, but they were unable to get a start. The Greek text of the Rosetta Stone was read easily. It proved to be a lengthy inscription in honor of one of the Alexandrian Ptolemies, under date of March 27, 196 B. C. A French scholar surmised that the hieroglyphic inscription was a duplicate of the Greek. This shrewd guess proved true, and the Greek inscription served as a dictionary for the other, much to the delight of those versed in the antiquities of Egypt. The substance of the inscription is a resolution of thanks passed by a synod of Egyptian priests in session at Memphis for a remission of arrears of taxes due by them. See HIEROGLYPHICS.

Rose Window, a type of circular window used in Gothic churches to carry out the artistic plan. These windows may be either of plain or bright colored glass, but usually the latter is preferred. The name, however, is given not for the type of glass used, but because of the shape of the window. When the light in the glass radiates from a central spot, the aperture is called the wheel window, the catherine wheel or the marigold wheel. These windows are generally placed over the doorways of the churches. There are many beautiful examples in Paris, Rheims, and Amiens.

Rosewood, a commercial name given to the timber obtained from several trees belonging to the pea family. They are closely related to the locusts and the mimosas. One rosewood is obtained in the East Indies. The chief rosewood of commerce, however, comes from the Amazon Valley. It is a hard, durable, rich wood, of a dark reddish color with resinous veinings. It is capable of taking a high polish and is much used in the manufacture of piano cases and other furniture. When first cut, it gives off a faint rose odor, whence the name. See LOCUST; MIMOSA.

Rosin and Resin. See TURPENTINE.

Ross, Alexander (1783-1856), a Canadian explorer and author, was born in Scotland, but removed to Canada while a youth. He had a varied career as school teacher, explorer and fur trader in the employ of John J. Astor and the Hudson's Bay Company. He settled in the Red River Valley early in the nineteenth century and did much to develop that fertile region. His books, all of which are valuable sources of reference, are *The Fur Hunters of the Far West, The Red River Settlement* and *Adventures of the First Settlers on the Oregon or Columbia River.*

Ross, Betsy (1752-1836), famous in history as the maker of the first American flag. Her father, Samuel Griscom, helped build Independence Hall. She was a humble seamstress, residing in a small, old-fashioned brick house in Arch Street, Philadel-

phia, when George Washington, heading a committee of prominent gentlemen, paid her a visit and stated that as they had heard that she was an expert needlewoman, they wished she would construct a flag to meet the specifications of a design adopted by Congress on June 14th. It was then that she made her famous suggestion to substitute five pointed stars to six pointed ones. The plan was adopted.

The flag which Betsy Ross made had the thirteen red and white stripes which still prevail, together with thirteen stars arranged in a circle on a blue field. So successful was she, that the government granted her a contract to supply all the flags, a work which was continued by her daughter until 1857.

Ross, Sir George William (1841-1914), a Canadian statesman and educator, was born at Naion, Ontario, and educated at Toronto Normal School. For some years after graduating he taught in the Ontario public schools. In 1872 he was elected to the House of Commons, where he served until 1883. From the latter year until 1899 he was minister of education for Ontario, and premier of the province from 1899 to 1906. Sir George entered the Dominion Senate in 1907 and was soon the senate leader of the Liberals.

While minister of education Sir George secured the passage of the law under which the Toronto University was federated, and as premier he was instrumental in advancing transportation and agriculture in Ontario. He wrote *The School System of Canada, The Senate of Canada, Life and Times of Alexander Mackenzie* and *Getting Into Parliament and After.*

Ross, Sir James Clark (1800-1862), an English Arctic and Antarctic explorer, was born in London. Entering the navy in 1812, he accompanied his uncle, Sir John Ross, in search of the Northwest Passage in 1818. In 1819-25 and 1827 he sailed with Captain Parry, in the latter year reaching the farthest point north that had been attained up to that time. Sir James again accompanied his uncle in 1829-33, and during this voyage the younger Ross determined the position of the north magnetic pole. In 1839 Sir James commanded an expedition for the discovery of the south pole. With his two ships, the *Erebus* and the *Terror,* he pushed through the ice floes south of New Zealand; discovering a large body of land, he named it Victoria Land. He also discovered several islands and an active volcano 12,000 feet high, which he named Mount Erebus. This expedition reached a latitude 78° 10′ S., which was the lowest southern record until 1900, when a latitude 78° 50′ was reached. Returning to England in 1844, he was knighted, and in 1848 commanded an unsuccessful expedition to Baffin Bay in search of Sir John Franklin. Sir James was made rear admiral in 1856. In his *Narrative of a Voyage in Antarctic Regions* is given a good account of his Antarctic discoveries.

Rosse, Willlam Parsons, Third Earl of (1800-67), an English astronomer. He was born in York and was graduated from Magdalen College, Oxford, in 1822. He was a member of Parliament from 1823 to 1834, and succeeded to the peerage in 1841. He was elected representative peer of Ireland in 1845. In Parliament he cared less for the discussion of the Reform Bill than he did for his reflecting telescope, then in the process of construction. The telescope measured fifty-two feet in length, with a speculum reflector six feet in diameter, weighing three tons. The cost of its construction and its erection in his park at Parsonstown was $150,000. In three particulars this speculum surpassed any hitherto known. It was more powerful and reduced to stars what had been described as nebulae through other instruments. Its large surface was unblemished by the warping and cracking which generally resulted from the ordinary casting processes at the time of cooling. The third advantage of his lens was the fact that he had reduced to a minimum light absorption and spherical aberration. At his death, his son took charge of the instrument and continued his work.

Rossetti, ros-sĕt′tee, a talented Italian family well known in the art and literary circles of London. The father, Gabriele Rossetti, was educated at the University of Naples and held a position in the museum of that institution. He became a member

of the secret society known as the Carbonari, and was active in promoting revolutionary ideas. In 1821 he was obliged to flee the country for his life. He became a professor of Italian in King's College, London, a position in which he acquired no little note as a commentator of Dante's *Divina Commedia.* He left a number of critical works relating to Dante's writings. He lived 1783-1854. Of four children, two sons and two daughters, who inherited their father's taste for literature, the best known is Dante Gabriel Rossetti, who has a wide reputation both as a poet and a painter.

Rossetti, Christina Georgina (1830-1894), an English poet. She was born in London and received her education there. She began writing when about twelve years of age, her first poems being printed by a private press owned by her grandfather. Her writing is largely of a devotional character. She has written also many beautiful poems for children. *The Prince's Progress, Goblin Market, A Pageant,* and *Sing Song* are among the titles of her publications. Of the following quotations the first is a bit of her philosophy of life; the second was written for children:

I'd laugh today—today is brief;
I would not wait for anything;
I'd use today that cannot last;
Be glad today and sing.

Who has seen the wind?
Neither I nor you;
But when the leaves hang trembling
The wind is passing through.

Who has seen the wind?
Neither you nor I;
But when the trees bow down their heads
The wind is passing by.

Rossetti, Dante Gabriel (1828-1882), an English poet and painter. He was the son of Gabriele Rossetti, an Italian poet. The younger Rossetti was born in London. He studied art at the Antique School of the Royal Academy. He became noted as one of the Pre-Raphaelite Brotherhood, which was warmly supported by Madox Brown and by Ruskin. Rossetti's most famous associates in the brotherhood were Millais and Holman Hunt. Rossetti painted in both oil and water colors. His principal paintings include *Dante's Dream, Salutation of Beatrice, Dying Beatrice, Blessed Damozel,* and *Monna Vanna.* Many designs were left unfinished. Rossetti's pictures were seldom exhibited so that his reputation depends upon the judgment of those who have had access to the private collection. This judgment is, for the most part, enthusiastic. Critics give him a high place among English poets. His contributions to literature include translations of the earlier Italian poets and a volume of ballads, songs, and sonnets.

Rostand, rōs′tän′, **Edmund** (1868-1918), a French dramatist. He was born at Marseilles and studied at the Marseilles Lycée and the College Stanislas of Paris. His three early dramas gave but slight promise of a brilliant future for the young dramatist, but they are characterized by spontaneous and subtle versification as well as elements of mysticism. *Les Romanesques, La Princesse Lointaine,* and *La Samaritaine,* were followed by *Cyrano de Bergerac* in 1897. The success of this play was immediate and wide spread, and it was pronounced "the finest dramatic poem of half a century" by French critics. It was played in Paris five hundred consecutive times. The subject-matter had a basis of reality. *L'Aiglon* was produced in 1900 and has as its protagonist the Duke of Reichstadt, Napoleon II. In 1902 Rostand was elected a member of the French Academy. *Le Chantecler* was first produced in February, 1910. It had been published some time before, but many difficulties attended the production of it on the stage because of the unusual nature of the play—all the characters representing birds or animals. It met with an enthusiastic reception and did not disappoint those who had come prepared to see a striking and novel performance. Rostand's work possesses a distinct charm which springs from his brilliant versification and sparkling wit. See BERGERAC, CYRANO DE.

Rot, a disease affecting sheep and other graminivorous animals. It is fatal and is caused by a parasite called the liver fluke, which lives in great numbers in the gall-bladder of the animal. The term is also applied to certain diseases of plants, resulting from attacks of fungi. The different kinds are distinguished by the names black rot, brown rot, root rot, dry rot, potato

rot, etc. The fruits suffer under the affection and when the tissues are deadened the fruit or berry turns brown or black and shrivels up and hardens. Dry rot attacks timber that is kept continually in moist places, such as mine props and in wooden ships, interior timbers below the water line. See FOOT-ROT.

Rotation, in agriculture, a short series of crops following each other in regular succession. In politics, rotation in office is taken to mean that an officeholder shall hold the position for a short time and then step down and out for good.

A system of rotation of crops is a changing of crops from field to field according to a fixed plan whereby the same crop comes back to the same field every few years. To carry out such a system requires as many fields as there are kinds of crops in the system adopted. If a farmer decides on the old time rotation of wheat, oats, and corn, he requires to divide his farm land into three fields or groups of fields as nearly equal as may be. For instance, if a farm consists of six fields, one of eighteen acres, one of twenty acres, and four smaller fields whose combined acreage is twenty-one acres, the four small fields may be grouped together and considered one in a plan of rotation. If we start with wheat in the first field and oats in the second, the rotation for the three fields will run, wheat, oats, corn; oats, corn, wheat; corn, wheat, oats. Thrown into a table we have:

Field.	1st Year.	2d Year.	3d Year.
A	Wheat	Oats	Corn
B	Oats	Corn	Wheat
C	Corn	Wheat	Oats

The fourth year each field is planted or sown to the kind of crop it had the first year of the rotation.

There are several reasons for a change of crops. Each kind of crop draws on the soil for a particular kind of plant food. When the supply of this kind of food runs short, the crop yield falls off. It is well to grow some other crop for a while. In the meantime the soil water may soak up a fresh supply of this plant food. The soil may in some cases get it from the air; or the farmer may supply the deficiency. No matter what the crop, it will run out if planted continuously in the same field.

The roots of a plant are likely to give off certain poisons that work against its own growth. In this way repeated croppings make some soils "wheat-sick," "flax-sick," etc. Then, too, a field devoted to one crop is likely to attract or breed plant and animal enemies. A field planted to potatoes year after year is likely to become infected with the germs that produce potato scab, and is sure to be the wintering place of potato beetles. A number of plant diseases, known as wilts, die out when the particular crops on which they feed are not planted continuously. Cotton, watermelons, tomatoes, flax, and a long list of other useful plants are, for this reason, the better for a change of soil. There is an old adage that it is not well to carry all of one's eggs in one basket. It is equally true that a farmer should not depend on one crop. Rotation gives variety. If one crop does not do well, another may. A variety of crops distributes farm work through the seasons to better advantage. The principles that underlie a plan of rotation are:

1. The series should include a money-making crop. This may be any one of the staple crops. The choice is dependent on soil and climate. In the Mississippi Valley, wheat, corn, cotton, and cane are the leading money-making crops, but each of the cereals leads in certain localities.

2. The plan of rotation should include a cultivated crop. This gives opportunity to kill weeds and get the soil into fine tilth.

3. A crop should be included that feeds the land, or else that gives a chance to enrich it. All plants of the pea family feed the soil. The best for the purpose are the clovers and the cowpea. The article on CLOVER will tell why. Meadow crops feed the land by increasing the supply of humus or decaying vegetable matter. Timothy is an excellent crop for the purpose. Timothy and blue grass sods will do wonders for a worn out field. Under ordinary circumstances, proper rotation requires the keeping of stock, not only to consume certain crops to advantage, but also to provide a supply of barnyard manure for the benefit of the soil. Put in another way, proper rotation includes forage crops. The rotation of corn, wheat, and oats mentioned above presumes a supply of wild hay and a liberal supply of barn-

yard manure to be applied to cornland before plowing. In some sections having a long growing season, two crops, as corn and potatoes, give a good chance to dress fields with fertilizers.

The following plans of rotation are typical of various parts of the United States and Canada. They vary in time from a three-crop rotation, requiring three years, to an eight-crop rotation.

1. Wheat, oats, corn.
2. Potatoes, oats, clover and timothy, timothy.
3. Wheat, summer fallow, wheat.
4. Corn, oats, clover.
5. Corn, oats, clover, potatoes, millet or grain, timothy pasture.
6. Corn, small grain, alfalfa, alfalfa.
7. Sugar beets, sugar beets, wheat, alfalfa.
8. Cotton, corn, grain and hay.

See CLOVER; COWPEA; SOILING.

Rothschild, rŏs′chīld, a famous European banking house. The founder was Mayer Anselm of Frankfurt-on-the-Main. He was of Hebrew ancestry and was born in the Jews' Alley in 1743. His father desired him to become a priest, but he preferred the business of a money changer. He had a reputation for honesty and ability and rose from poverty to affluence. When Napoleon was marching on Cassel, the elector sent for Mayer Anselm and intrusted him with the treasure in his vaults, valued at $5,000,000. The Jewish banker and his friends succeeded in concealing the treasure, thus saving it from the grasp of the French. The prince permitted him to use the money for some time without interest. The safe return of so large an amount gave the banker a world-wide reputation.

The family name of Rothschild was derived from a red shield or armorial bearing over the door of the building in which he did business. Mayer Anselm Rothschild set up five sons in the banking business in the five capitals of Europe: Anselm in Frankfort; Nathan in London; Solomon in Vienna; Jacob in Paris; and Karl in Naples. Under his instructions they formed a general partnership, which controlled speedily the largest aggregate of capital known in ancient or modern times. The London house is said to have made a million dollars in a few hours by acting on private advices and buying up English securities at a low price before the news of the battle of Waterloo became generally known. The house of Rothschilds has maintained its financial strength by admitting successive members of the family into partnership and by close intermarriage between cousins, thus keeping the wealth all in the family.

It is said that during the Napoleonic wars, the house raised and loaned to the various nations a sum not less than $500,000,000. The larger public loans managed by the firm since that date have been for Great Britain, Austria, Prussia, France, Italy, Russia, and Brazil, aggregating, it is said, $2,345,000,000. The firm holds a large amount of United States bonds. During the late war between Russia and Japan, the Rothschilds controlled practically the monetary situation. The firm controls so large a part of the world's wealth that nations are practically unable to go to war without its permission. In 1868 a Rothschild died in Paris worth $400,000,000. The firm controls the precious metals of Mexico. A Rothschild was the first Jew ever admitted to the English Parliament.

Rotterdam, one of the chief commercial cities of the Netherlands. It is situated near the mouth of the Rhine, and is the center of an extensive system of canals. A large part of the city stands as it existed during the Middle Ages—an area of narrow, crooked streets and quaint old houses with red tiles and wooden gables. Rotterdam carries on an extensive foreign and domestic trade. It is said that, of European cities, it is second only to London in the amount of freight passing through. The most interesting part of the city is the busy quays, where an army of men and creaking cranes are busy unloading casks, boxes, and barrels —all sorts of merchandise imaginable. In front of the wharves there is a forest of masts. There are 500 acres of harbor and twenty miles of walled quays. A new harbor under construction doubles this capacity. There are large parks, a well kept zoölogical garden, several interesting churches, an academy of fine arts, numerous museums, and other public buildings. The population in 1920 was 510,538.

Rouen, rōō-ŏN′, a city of France. It was formerly the capital of Normandy. It is situated on the Seine about two-thirds of the way from Paris to Havre. It is now an important cotton-manufacturing center, termed sometimes the "Manchester of France." It also carries on an extensive trade in Bordeaux wines. The venerable cathedral of Notre Dame, built in 1207-80, is noted for an imposing front surmounted by lofty towers. There are exquisite wood carvings, fine sculpture, and beautiful rose windows. The porch of the church of Saint Maclou is one of the most beautiful bits of architecture in France. The openings in the stone work are shaped like tongues of flame. The church of St. Ouen, dating from 1318, surpasses even the cathedral in size and beauty of style. The front, or façade as it is called in architecture, contains three great portals adorned with numerous statues and reliefs. A rose window above the central portal is one of the finest specimens of stained glass known. The walls contain an unusually large number of windows, 135 in all. The stained glass of which they are constructed is celebrated for beauty and quality. Other buildings of importance are the city hall and the palace of justice. The city belfry, or the tower of the great bell, was erected in 1389. The city possesses a large library, a museum of paintings, and several important collections of antiquities. The city derives no little interest from its connection with the life of Joan of Arc. A relic of the citadel in which she was tried for witchcraft still stands. An insignificant fountain occupies the spot in the square where she was burned at the stake in 1431. **Population, 123,712.** See JOAN OF ARC.

Rouge, rōōzh, a cosmetic used in coloring the cheeks. It is prepared from carmine and from safflower or carthamus. Another variety of rouge, known as English red, is used by jewelers for polishing silver. It is essentially of a fine quality and is obtained by heating crystals of oxalate of iron to a high temperature until decomposition occurs, when a red powder remains after the carbonic acid has escaped. The high polish and smoothness of the speculum of the telescope is obtained by a careful application of this polishing powder.

Rough Riders, the popular name of the First Regiment of the United States volunteer cavalry in the Spanish-American War. Leonard Wood was colonel and Theodore Roosevelt was lieutenant-colonel. The regiment numbered one thousand men and they gained their name because of the fact that a large per cent of the soldiers came from the ranches of the west. They distinguished themselves in the battles of El Caney and San Juan, taking an active part in the whole Santiago campaign. The uniform consisted of a blue flannel shirt, brown trousers, a slouch hat, leggings, boots, and a loosely-knotted handkerchief around the neck. The name was originally applied to the messengers who scoured the western states before 1859, when the pony express was organized. William F. Cody in his Wild West Show gives an exhibition of the Rough Riders of the world. See SPANISH AMERICAN WAR.

Roulette, rōō-lĕt′, a gambling device. An ivory ball is laid upon a revolving disk about which it rolls until it is thrown into one of thirty-six compartments around the edge. The players bet as to which of the compartments the ball will enter. This they do by laying their money, or chips purchased from the owner of the machine, by the pocket on which they desire to stake their money. If the ball enters some other pocket, the money is lost. If it enters the pocket designated, the banker pays the better thirty-six times the amount of money staked. One or two blank pockets are reserved for the benefit of the roulette banker who owns the machine. It is a fascinating form of gambling by which many fortunes have been lost. See MONACO.

Roumania. See RUMANIA.

Round Robin, a protest or remonstrance addressed to superior officers and signed in such a way that no particular name heads the list. This is accomplished by writing names along lines representing the spokes of a wheel, or around its circumference. This method appears to have arisen among the petty officers of France. The term is derived from the French *rond-ruban,* meaning round ribbon. It is a favorite form of remonstrance among sailors who desire to ask for better food or different treatment of any sort. See PETITION.

Round Table, The, in British legend, a beautiful table—some say of marble—large enough to seat one hundred fifty knights. It was made by the magician Merlin for Uther Pendragon, and given by Uther to Leodegraunce, King of Cameliard. When King Arthur married Guinevere, daughter of Leodegraunce, the latter gave Arthur this table with one hundred knights as a wedding gift. Merlin filled twenty-eight seats with worthy knights, Arthur elected two more. Twenty seats were left to be filled as knights should prove themselves worthy. Other accounts of the Round Table state that it would seat only fifty knights. Still others describe it as a small table at which the king and twelve chosen knights might sit. In any case the name of each knight is inscribed upon the table at his own place, and one place is left for the Holy Grail. This is called the "siege perilous," since it was believed that no knight other than he who should discover the Holy Grail might sit there and live—siege meaning seat. The Round Table is mentioned in more than one medieval legend and ballad, showing that it was not peculiar to the reign of Arthur. The expression, "round table," is not unusual to designate a tournament, so called from the fact that a tournament was held usually in a circular court, level like a table, and surrounded by a strong wall. The Order of the Round Table was an institution founded by King Arthur. Only a knight who had proven his valor and fidelity might hope to be made a member of this order.

Rousseau, rōō-sō′, **Jean Jacques** (1712-1778), a French writer and reformer. He was born at Geneva, Switzerland, June 28, 1712. He died near Paris, July 2, 1778. His father, Isaac, was a watchmaker of French ancestry. Jean received an elementary education under the tutorship of a Protestant clergyman. At fifteen he was placed in the office of an attorney to draw up documents, but was soon dismissed for want of capacity. He was then apprenticed to an engraver, from whom he ran away to escape harsh treatment. The remainder of his life may be described as a sort of vagabondage. He lived in a great many homes, none of them his own, and made many friends, all of whom he lost, not infrequently through faults of his own. In an autobiography, published under the name of *Confessions,* he tells of the various scandals of his life with peculiar frankness. While a lackey in the house of a certain countess he stole a ribbon and charged its loss to a maid. In consequence both were dismissed. Various scandalous connections are detailed in the *Confessions,* the particulars of which are of no profit to anyone. He lived in Lyons for a time, maintaining himself as a tutor. He picked up a living in Paris in various obscure ways, such as copying music. Here he became acquainted with the chief literary men of the time, and was even admitted to certain learned societies. At one time he obtained an appointment as secretary to the French ambassador at Venice, a position which he retained but a short time.

Rousseau wrote an inconceivable number of miscellaneous essays, letters, and treatises. His influence was felt chiefly in a work known as the *Social Contract,* which appeared in 1762. It was a discussion of the theory of government. He held that all men are born equal; that ownership of property is a crime; that the soil belongs to no one; that monarchy is tyranny, and religion superstition. This work was denounced by all the authorities, but was none the less read widely, and had, it is said, an immense influence in bringing on the French Revolution. Among others, Robespierre was imbued thoroughly with the doctrines of Rousseau. The *Social Contract* is now little read.

Another treatise that had a profound influence was the celebrated work on education, *Émile.* In this volume he described in detail the life of Émile from infancy to mature manhood. Although we may say of Rousseau that he himself was no man at all, and that he set a wretched example, it must be acknowledged that his book had influence on French society. It was condemned by the clergy for its irreligious views. Rousseau was obliged to flee from France to save his life. At one time in his wanderings he visited England, where he was entertained by the historian Hume. The more *Émile* was attacked by the authorities, the more it was

purchased and read. One or two passages will give some idea of the work. Although Rousseau himself sent five of his children to the Foundling Hospital of Paris in succession, he inveighed against the custom of intrusting children to hired nurses:

> Let mothers vouchsafe to nourish their children and our manners will reform themselves. . . . The attractions of home life present the best antidote to bad morals. The bustling life of little children, considered so tiresome, becomes pleasant; it makes the father and the mother more necessary to one another, more dear to one another; it draws closer between them the conjugal tie. . . . When women are once more true mothers, men will become true fathers and husbands.

Such doctrines had a tremendous influence for a time. It became fashionable for great ladies to make a show of nursing their children. The affectation even went so far as to bring infants to the table with the dessert that the mothers might nurse them in public. Notwithstanding his own faithlessness in this respect, Rousseau also attacks fathers for neglect of their children:

> He who cannot fulfil the duties of a father has no right to be a father. Not poverty, nor severe labor, nor human respect can release him from the duty of supporting his children and of educating them himself.

In another passage he speaks of the necessity of allowing children to grow up without too much restraint. Said he:

> Emile shall have no head-protectors, nor carriages, nor go-carts, nor leading strings. From the time when he begins to be able to put one foot before the other, he shall not be supported. . . . Let him be taken every day far out into the fields. There let him run about, play, fall down a hundred times a day; the oftener the better, as he will the sooner learn to get up again by himself. The boon of freedom is worth many scars. My pupil will have many bruises, but to make amends for that, he will be always lighthearted.

In short, he follows Émile through life discussing nursing, clothing, exercise, discipline, and instruction. With certain exceptions, his educational ideas have received universal assent. Rousseau's ideas were, however, far ahead of his day. Among the more distinguished of his immediate disciples were Pestalozzi and Froebel. It may interest boys to know that Rousseau advised that Émile "should be encouraged to play Robinson Crusoe; to imagine himself clad in skins, wearing a great cap and sword, and all the array of that grotesque figure, down to the umbrella." He declared *Robinson Crusoe* to be the best book for boys ever written.

Rousseau died presumably from an attack of apoplexy, although suicide was suspected. For many years he had been partly insane, imagining that he was the victim of persecution. It is believed by many that he was under hallucinations of this sort when he wrote his *Confessions*.

QUOTATIONS FROM ROUSSEAU.

He that cannot command felicity may at least deserve it.

Take from the learned the pleasure of being heard and their love of knowledge would vanish.

I am . . . an active and intelligent being, and . . . I dare claim the honor of thinking.

O conscience, divine instinct, immortal and celestial voice, the unfailing guide of an ignorant and finite but free and intelligent being.

There is no sacred and inviolable charter binding a people to the forms of an established constitution. The right to change these is the first guarantee of all rights.

Your very governments are the cause of the evils which they pretend to remedy. Ye scepters of iron! ye absurd laws! ye we reproach for our inability to fulfil our duties on earth!

The deputies of the people are not, nor can they be, its representatives; they are simply its commissioners, and can establish no final compact. Every law not ratified by the people themselves is null and is no law.

SAID OF ROUSSEAU.

The great professor and founder of the Philosophy of Vanity.—Edmund Burke.

That bearish Rousseau.—Taine.

His grand defect was in strength of will.—Chambers.

Rowan Tree. See MOUNTAIN ASH.

Rowell, Newton Wesley (1867-), a Canadian statesman, was born in Middlesex County, Ontario, and was educated in the public schools and at the Ontario Law School. He was called to the bar in 1891 and practiced for some years in Toronto, rising to leadership in his profession. In 1911 Mr. Rowell was elected to the Ontario legislature and was chosen to lead the Liberal opposition. During his term in the legislature Mr. Rowell was firm in his advocacy of such reforms as prohibition of child labor, shorter working days for youths and women, better housing, improved workmen's compensation and factory laws

and the abolition of barrooms in Ontario. In 1917 he was elected to the Dominion House of Commons, and was a member of the Imperial War Cabinet and Imperial War Conference in 1918. Mr. Rowell was Canada's representative in the Assembly of the League of Nations, and is a fervid advocate of the League.

Rowland, rō′land, **Henry Augustus** (1848-1901), an American physicist. He was born in Honesdale, Pennsylvania, and received his education in Rensselaer Polytechnic Institute in Troy, New York. He taught science in Wooster College, Ohio, for a year, returned to Troy in 1872 as teacher of physics, and in 1876 was elected professor of physics in Johns Hopkins University, which position he held until his death. During a year's leave of absence he traveled in Europe, studied in Berlin, and worked for a while in the laboratory of Helmholtz. In 1881 he was elected to the National Academy of Science and became a member of the Electrical Commission in Paris the same year. His electrical discoveries were important and brought him to the front rank among scientists. His photographs of the solar spectrum were among the best ever made, and their success was due to his perfection of the dividing engine, an instrument having concave mirrors on which the large diffraction gratings are ruled. He originated the multiple telegraph instrument, made an accurate determination of the ohm, and carried on many extensive electrical investigations and experiments. He has written a large number of monographs and scientific papers, among which are *Magnetic Effect of Electro Connection, Research on the Absolute Unit of Electrical Resistance, On the Mechanical Equivalent of Heat, and Photographs of the Normal Solar Spectrum.*

Royal Canadian Mounted Police, formerly the Royal Northwest Mounted Police, is the mounted constabulary that polices all the area that was ever comprised in the Canadian Northwest Territories. The organization—commonly known as the "mounties"—was begun in 1873 in accordance with the need of governing an extent of unsettled territory that measured approximately 900 miles each way.

In the Act of Parliament that authorized the organization of this body it was specified that members should be between the ages of 18 and 40—the minimum was later raised to 22—and should be physically sound, able to handle arms, able to ride, able to read and write English and French, and should be of good character. The unusual degree to which a "mountie" is on his own resources has always insured to the service a type of man who is in every way self reliant—the type of man who can do his own thinking and do it quickly.

In October, 1873, about 150 men had been enlisted in the service and were sent to temporary headquarters at Fort Garry. By June of the following year there were 200 men enlisted. These left Toronto for the Northwest, but proceeded by way of Chicago, St. Paul and Fargo. They took the long trail from Fargo to Saskatchewan on horseback, enduring untold suffering but finally establishing their posts in the great Northwest.

Duties. To the Royal Mounted is due much of the credit for the settlement of the Northwest, for without the protection of this body of men the settlers would have been greatly retarded in their work of cultivation. The prime duty of the force is to maintain law and order, but incidentally its members act as guides, doctors, agricultural advisers, fire fighters, mail carriers and in a great number of other capacities.

Organization. The headquarters of the force used to be at Regina, Saskatchewan, but now are located at Ottawa. On the shores of the Arctic Ocean in the extreme northwest corner of the Dominion, on Herschell Island, is one of the division headquarters; another is on the northwest shore of Hudson Bay, and the others are widely scattered. The force is organized on military lines but is nevertheless a civil body under the control of the Premier. The commissioner, assistant commissioner and comptroller are stationed at Ottawa. The constables, as the troopers are called officially, and officers, are entitled to a pension after 20 years of active service or if forced out of the service on account of injury or ill health. When the two provinces of Saskat-

chewan and Alberta were organized in 1905, the necessity for such services as those performed by the Mounted Police was much decreased. Finally, within the last few years, the force has been combined with the "Dominion Police," with headquarters at Ottawa; the new body combines the duties of a "Scotland Yard" and Investigation and Intelligence Services.

From the first the organization attracted men of high grade, and college and university graduates have always been numbered among its members. During the World War hundreds of the force took their discharge to serve with the Canadian contingent in France. Because of this depletion of their numbers, the Mounted were obliged to withdraw from their former duties of policing Saskatchewan and Alberta.

Royal Institution of Great Britain, an institution founded in 1799, at the suggestion of Count Rumford, for the purpose of promoting scientific research. It was incorporated under a royal charter in 1800, and a decade later when it was re-organized its interests were widened and extended. Young scientists are encouraged and given greater opportunities for study and research. The practical relation between the arts and sciences is indicated, and the close connection between mechanical inventions and the needs of daily life is clearly manifested in the exhibitions of experimental researches given from time to time. Among the famous lecturers have been Dr. Thomas Young, Sir Humphry Davy, Tyndall, Faraday, and Huxley.

Royal Society, London, an organization of learned men founded for the study and promotion of natural science. It was organized in 1660, but the club had held meetings in London prior to this, as early as 1645. The scientific papers read and discussed at the weekly meetings, which are held from November to June every year, are published in the *Philosophical Transactions,* issued annually since 1665. *The Proceedings*, published from 1800 to the current year, contains a synopsis of the papers read and records of the proceedings of the regular meetings. The society acts as scientific adviser to the government, and determines the manner in which the annual apportionment of $20,000 set aside for scientific purposes shall be spent. All the prominent scientific men of England have been members of the society. It awards the blue ribbon to Englishmen and foreigners, bestows the Copley, Davy, and Rumford medals on persons who have won distinction in scientific achievement. Research and enlightened investigation are always encouraged by the organization.

Royce, Josiah (1855-1916), an American philosopher. He was born in Grass Valley, California. After graduating from the University of California, he went to Leipsic and Göttingen where he continued his studies, and in the year following his return to America (1877-8) he studied in Johns Hopkins University. He returned to the University of California in 1878 as an instructor in English, and in 1882 became instructor in philosophy at Harvard, where he was elected professor of the history of philosophy in 1892. He has won distinction as a thinker among the leading scholars of the country, and his sympathies are closely associated with the Neo-Hegelian movement of modern thought. His views are clearly presented in his books *The Religious Aspect of Philosophy, The Conception of God, Studies of Good and Evil, The Conception of Immortality, The World and the Individual, Gifford Lectures, Outlines of Psychology.*

Rubaiyat. See OMAR KHAYYAM; FITZGERALD.

Rubber, a substance found in the milky juice of a thousand species of plants. Fifty species are of commercial importance. Rubber is found in small quantities in the milkweed, in dogbane, and in the milky sap of many northern plants; but the rubber of commerce is obtained chiefly from Brazil, Central America, Africa, and Farther India. It became known first as an American product. Columbus found the natives of Haiti playing with a ball "made of the gum of a tree," that was lighter and bounced better than any known at home. It was reported that the Indians of Mexico made a shoe of a gum which they taught the Spaniards to use as a wax to render their cloaks waterproof. Pieces of this were first

used in England to rub out pencil or India ink marks; hence the name, india rubber.

The greater part of our supply comes from the giant forest trees of Brazil. The trees are tapped somewhat after the fashion of maple trees, and the gum is collected in tin or clay cups. The collector hardens and colors his rubber by drying and smoking it in a fire built in a small pit for the purpose. He first pours the contents of a cup on the blade of a stick shaped like a paddle. This he holds and turns in the heat and smoke until it is hardened. He then pours on more rubber and repeats the process until the ball of rubber is too heavy to handle to advantage. He then passes a knife under the edge of the rubber around the blade of the paddle, and slips the mass off. The best rubber comes down the Amazon to Para, the greatest rubber market in the world. Rubber is the chief export of the Congo Valley also.

In its natural state, rubber loses its elasticity when cold and softens by heat; that is, a rubber shoe made of natural rubber would be brittle in very cold weather and doughy in very warm weather. Comparatively little use could be made of natural rubber. In 1844 Mr. Charles Goodyear (1800-1860), took out a patent for vulcanizing rubber, as the process is called. He found that by shredding and washing rubber free from impurity and then heating it with sulphur, he not only increased its elasticity, but rendered it more nearly proof against changes of heat and cold. In all, Mr. Goodyear's patents cover sixty processes and devices. This is really the beginning of the application of rubber to hundreds of purposes from the waterproofing of a mackintosh to the making of a rubber valve. The immense amount of rubber goods produced in this country alone is evidence that rubber must be adulterated in every possible way to supply the demand. Brazil, which ships nearly half of the world's supply sells only 43,000,000 pounds annually.

Of late the city of London has put rubber to a new use. In searching for a pavement material that will obviate the noise of stone and the slipperiness of asphalt, a trial was made of rubber. A few squares, railway yards, and hotel courts have been paved with a combination of rubber at a cost of $32.70 per square yard. The promoters of this pavement claim that at an expense of from $30 to $40 per square yard an ideal durable noiseless pavement can be laid.

The demand for rubber has led to the cultivation of rubber-producing plants. The most prominent is the para rubber tree, spoken of sometimes as the hevea and also as the Brazilian rubber tree. Plantations have been established in the West Indies and in the moist, hot, fertile East Indian countries along the equator that market at Singapore. The plants are raised from the seeds. The seedlings are potted in bamboo joints. When about a foot high they are removed from the nursery to the plantation. The trees grow very rapidly, gaining from eight to fifteen feet in height yearly. At six years of age they are large enough to tap. The plantations are yet too young to ascertain the life of the tree, but some of the planted trees have yielded rubber for thirty-five years. Parent trees in the Amazon Valley have been tapped for eighty years. The usual method of tapping is a vertical incision with slanting incisions leading into it, something like the ribs of a leaf. A cup is placed at the lower end of the central incision to catch the milky flow. By freshening the incisions daily the flow of rubber may be kept up the year around, but it is customary to allow a tree to rest a few months that the incisions may heal.

The second rubber plant of importance is the Central American rubber tree. It is related to the bread fruit. It is cultivated in plantations in the northern part of South America and in Central America. Methods of cultivation are much like those employed in rearing the para tree. The Panama rubber requires, however, a little cooler climate than the para rubber. The yield of the Panama rubber is greater, but the quality is not so good. A third rubber tree, a relative of the tapioca plant, is quite unlike the two already mentioned. It is a drought-resisting plant, and does best in a sandy region where a season of early rainfall is followed by a season of dry weather. Other rubber plants are cultivated in the Malay region, in Trinidad, and in West Africa, respectively, but their

cultivation is not very extensive as yet.

The world's production of crude rubber in 1921 was 295,642 long tons, of which the bulk, or 272, 915 tons, was so-called "plantation" rubber, 19,837 tons from Brazil, and 2,800 tons of other kinds. The world production has practically quadrupled since 1910, chiefly owing to the enormously increased demand for rubber in the manufacture of automobile and truck tires. Nearly 76 per cent of the planted acreage of plantation rubber is owned by British capital, and 5.6 per cent by American capital, according to the best available authorities. The 55,000 acres planted and controlled by American capital are comprised in the estate of the General Rubber Company in Sumatra. American interests have also recently acquired 40,000 acres of undeveloped land in Sumatra. A limited area is also planted to rubber in Mindanao, Philippine Islands. See INDIA RUBBER; GUTTA PERCHA; MILKWEED.

Rubens, roo′benz, **Peter Paul** (1577-1640), a celegrated Flemish painter. He studied in Mantua, Naples, and Rome. He did his best work at Antwerp. His greatest work, the *Descent from the Cross,* is in the Cathedral of Antwerp. Ninety-five of Rubens' paintings are at Munich. His *Last Judgment* depicts Christ with a more merciful face than that of the Christ of Michelangelo. Among those who join the company of the blessed is a poor, rejoicing negro, showing that Rubens was ahead of his time.

Rubicon, rū′bĭ-kon, in classical geography, a little stream in Italy, dividing the province of Gaul from Rome proper. When the Senate at Pompey's instigation gave orders to send home part of his army, Caesar, it is said, rode up and down the banks of the Rubicon debating with himself all night whether to comply or to march on Rome. At daybreak he gave marching orders; hence the expression, "crossing the Rubicon," denotes taking a step which cannot be retraced. See CAESAR; POMPEY.

Rubidium, a metallic element of the sodium group. It was detected in 1860 by Bunsen and Kirchoff by means of spectrum analysis applied to a residuum of mineral water. It gives two red lines in the blue part of the flame. It has a specific gravity of 1.52. At ordinary temperatures it is as soft as wax. In appearance and qualities, it resembles potassium, burning like that element explosively on water and slowly in air. See POTASSIUM.

Rubinstein, rōō′bĭn-stīn, **Anton Gregor** (1830-1894), a Russian composer and pianist. He was of Jewish parentage and was born in Wechwotynetz. He studied first under his mother who was an accomplished musician, and his other teachers in Moscow, Paris, and Berlin were Villoing, Liszt, and Dehn. In a concert tour undertaken at this time he was eminently successful, but he settled down to quiet and further study in St. Petersburg in 1848. After seven years he returned to Germany, published his compositions, and entered upon a second triumphant concert tour in France and England. He was appointed court pianist in St. Petersburg in 1858, directed the Russian Music Society for two or three years, and remained director of the newly-founded St. Petersburg Conservatory until 1867. His concert tours in Europe were continued and were extended to America in 1872-3. His technique was brilliant and unexcelled. His compositions are characterized by sweetness and melody rather than depth and power. He was prolific and versatile, composing a great number of sonatas, symphonies, orchestral and vocal scores, etc. His operas, fifteen in all, met with only limited success, but his *Ocean Symphony* and the pianoforte concertos in D minor and in G major, rank as his best works and are also the most widely known.

Ruble, or **Rouble.** See RUSSIA.

Ruby, a rich red, transparent, precious stone, scientifically known as a variety of pure corundum. Rubies are found in Ceylon and Siam. The finest rubies are from Burma, where they occur like drops of metal in limestone. Where the parent rock has been disintegrated, they are found in beds of gravel. Genuine rubies, of small size, however, are found in the Cohee Valley in North Carolina. A pale red topaz from South America is known as the Brazilian ruby. The rock ruby is a red garnet. A genuine red ruby of the best color is the most expensive of gems. It is worth from three to ten times its weight in diamonds of its own size. Most of the stones sold as

rubies are, it is needless to say, cheap stones, or even imitations in glass.

Rudolf, or **Rudolph** (1218-1291), the founder of the Austrian house of Hapsburg. The Hapsburgs were of Swiss origin. Rudolf, partly by inheritance and partly by force of character, acquired an ascendency over the Swiss cantons of Lucerne, Zug, Zurich, and Berne. He was granted the title of protector of the French cantons. In 1273, chiefly through the instrumentality of his powerful friend, the Archbishop of Mainz, Rudolf was elected emperor. He made peace with Pope Gregory XI by renouncing all imperial claim to interfere in the appointment of bishops and other dignitaries of the German church. He brought Bohemia and Moravia unmistakably under the rule of the empire. He reduced many refractory nobles to subjugation by storming and destroying their strongholds. It is said that in one year he razed sixty castles and beheaded thirty of their robber owners. Under his strong rule the pack trains of the merchants were comparatively safe, and the free cities of the empire prospered. See HAPSBURGS.

Rue, an herb, wild or cultivated, possessing poisonous qualities. It grows two feet high, has bluish-green leaves, yellowish-green flowers with crimped petals, a strong smell, and a bitter taste. Its medicinal properties were recognized by primitive people and with these were associated qualities which were said to possess a charm against witches, hence the plant was used in connection with magic rites. Ophelia, in *Hamlet,* says:

"There's rue for you . . .
We may call it, herb of grace o'Sundays.

Ruff, a wading bird. It is closely allied to the sand-piper and lives in the northern parts of Europe and Asia. These birds migrate southward in the winter and are found in small numbers in Iceland, Canada, and on the eastern coast of the United States. They live in swamps and fens, nest on the ground, and feed on rice, seeds, larvae, insects, and worms, chiefly at night.

Ruffo, Titta (1879-), a noted Italian baritone, was born in Pisa, Italy. For a time he studied under his brother, and while still very young he entered the Santa Cecelia Conservatory at Rome. He was very ambitious for an operatic career, but after two years of study he was told that he had not the voice to attain the success he coveted. It was found impossible to discourage him, however; he went to Milan, where, under a competent teacher, he developed remarkably. After touring South America, he returned to Italy, where his triumph was complete.

In 1912, Ruffo appeared in the United States, making his debut with the Metropolitan Opera Company in New York. Later, he sang with the Chicago Grand Opera Company. Ruffo has won success in lyric and in dramatic roles, and has done probably his best work in the operas *Hamlet* and *Pagliacci.*

Rug, a woven mat. Historically the word means rough; hence a rug is a rough piece of heavy cloth. The word is applied to a lap-robe, to a traveler's heavy wrap, to a bed-quilt, but ordinarily to a square or oblong covering for the floor. By way of distinction, the word tapestry applies to hangings. As distinguished from a carpet, a genuine rug is woven in one piece and is laid loosely on the floor or ground or in front of a bed or fireplace. Owing to the ease with which rugs may be taken outside and dusted, loose rugs and hardwood floors are gaining rapidly in favor. For this reason, carpeting is now extensively made up in the form of removable rugs.

The rug is of great antiquity. There were rugs in the houses of the Homeric heroes. The palaces of the Egyptian pharaohs were furnished with rugs.

The rug is oriental. Long before the European savage had learned even to strew rushes for his comfort, Persia and India were noted for handsome and costly rugs. From the earliest days of caravan traffic, rugs for the western market formed one of the important articles of oriental commerce. Both Greeks and Romans esteemed oriental rugs. The Moors brought the use of rugs into Spain. The Venetians imported eastern rugs into Italy and western Europe. In the Middle Ages rugs were spread in the presence chambers of kings, before the high altars of cathedrals, in ladies' bowers, at open air feasts, by the minstrel singers,

and by the fortune teller. Descriptions of festivals and banquets and coronations lay stress on the use of rich tapestry rugs embroidered with gold.

Among the nomadic peoples of Europe the rug has seemingly answered the purpose of the buffalo robe among the western American Indians. Rugs easily carried from place to place form a grateful protection where spread on the hot sand, whether in tent or under the shelter of a palm tree. The devout Mohammedan is never without his prayer rug. When the hour arrives, even the camel driver alights, places his rug on the sand—the point of the figure toward Mecca—and performs his devotions.

About 1664 Colbert, the minister of Louis XIV, introduced the business of rug and tapestry weaving into France. The industry thus started spread into Belgium, Great Britain, and elsewhere, developing finally into the modern industry of carpet weaving. Persia, India, and Turkey are seats of the rug industry. In Persia particularly, the inhabitants of many villages have been rug weavers for generations. Rug weaving requires patience and skill. Dyeing is an art in itself. Formerly only vegetable dyes, as indigo and madder, were used, but of late, despite royal edicts to the contrary, the use of the cheaper but less durable aniline dyes has crept in. The prevailing colors are red, brown, orange, and creamy white, blue, and green, in many lustrous tints and hues. The ground of a prayer rug is green, the sacred color of Mohammedanism. The loom is primitive. The warp, usually of linen or hemp, is stretched in a frame. The woof, usually of the finest wool, is tied in by hand, and is cut off. These knots or tufts are pressed closely together and held in place by the tying. The short, free ends form a close, velvety surface that presents the ends of the fibers to the foot. The amount of work involved in the finer rugs is incredible. The finest require over nine hundred knots to the square inch. The very coarsest require forty knots. A deft workman can knot three ties per minute. A large silken Kashmir rug exhibited in England in 1851 had pile an inch thick. It was composed of 100,000 knots or tufts, not to the square yard, but to the square foot. The rugmaker works according to patterns, choosing each thread for its color. Rugs made in this way are the most durable kind of carpet known. Some of these rugs have been in constant use in Persian palaces for over 300 years.

The rugs of India find their way to market chiefly by way of Bombay. The rugs of Persia and Afghanistan come west by caravan until they strike a railway. They are marketed largely by way of Constantinople. Turkish rugs, by far the greater bulk of modern oriental rugs, are shipped also from Constantinople, but chiefly from Smyrna. The latter city is the most noted rug market in the world. The most expensive rugs are antique, that is, second-hand rugs from the old Asiatic centers of rug making. The dyes, wools, and patient workmanship of the Persians cannot be duplicated. In fact, the longer their antique rugs are worn, the more lustrous they become. A large Persian rug was sold at auction in 1903 in New York City for $45,000. Antiques valued at several thousand dollars may be seen in the stores of any large city, as Chicago, and $500 rugs are not infrequently displayed in the smaller cities, though one-tenth of the latter sum, or possibly even $20, will purchase a beautiful prayer rug that has traveled with caravans and been spread beneath the knees of devout worshippers, it may be, for a century or two.

See CARPET; WEAVING.

Rugby, a market town of England. It is situated pleasantly on the Avon a few miles northeast of the Shakespeare region. It is noted as the seat of the Rugby public school, a university preparatory school for the sons of wealthy families. The school was founded in 1567 by a wealthy London merchant. The principal buildings are Elizabethan in style and form an imposing quadrangle. The football and cricket grounds for which Rugby is noted lie in a beautiful park of eleven acres. Rugby football rules originated here. The school accommodates about 500 students. The school attained prominence under the headmastership of Thomas Arnold. Among his successors were Archbishop Tait and Dean Bradley of Westminster. Matthew Arnold, Dean Stanley, Landor, Clough, and Thomas Hughes, the author of *Tom Brown at Rug-*

by, were Rugby students. See ARNOLD; HUGHES.

Rum, a distilled liquor, akin to whiskey. It is prepared from the fermented juice of the sugar-cane or from molasses. The sugar growers of the West Indies save all the skimmings from the evaporators in which sugar is made. It makes the highest priced quality of rum. In colonial days rum was an important article of New England trade. The slavers of Liverpool, too, used to set out with a stock of beads and gewgaws to be exchanged for slaves on the African coast. The slaves were sold in our Southern States and the proceeds were invested in Jamaica rum for a home cargo. In this way three profits were made in a single trip. In 1902 Cuba exported 1,308,634 gallons of rum. In the same year Great Britain imported over a million dollars' worth of rum from her West India possessions. Rum is distilled largely in New England also. See ALCOHOL: DISTILLING.

Rumania, or Roumania, a kingdom of southeastern Europe. It includes the old provinces of Moldavia and Wallachia. It extends from Hungary, that is to say, the Carpathian mountains, to the Black Sea. It lies chiefly on the north bank of the Danube, by which it is separated from Servia and Bulgaria. The Pruth forms a considerable part of the boundary between Rumania and Russia. Bucharest is the capital.

The surface consists in the main of extensive agricultural plains. The foothills of the Carpathians are covered with forests of oak, fir, and beach that still shelter the stag, wild boar, wolf, fox, and Carpathian goat. The hare and the marten are hunted for fur. The Danube and the Pruth abound in food fishes. The mountains yield copper and rock salt. Some gold is found. There are deposits of sulphur, asphalt, and petroleum.

Aside from the forest region, which comprises possibly a sixth of the surface, and saline lakes near the mouth of the Danube, Rumania is fertile. The climate is continental. The summer is dry and hot. The winter is severe for that latitude, the Danube being frozen over for a month or two. The chief productions are wheat, maize, rye, barley, oats, tobacco, hemp, and flax. The grape, from which fine wine is made, flourishes on the sunny slopes of the Carpathians. Cattle, horses, sheep, and swine are the important domestic animals. Its manufactures are mostly domestic commodities.

Trade is largely in the hands of Jews. Corn, meat, timber, and fruits are the chief exports, most of which go by way of the Danube and the Black Sea. There are important lines of railway. The country is covered well by telegraph and telephone lines. The monetary unit is the lëu, plural leï, about five to our dollar.

The government is a limited monarchy. The legislature consists of two houses. A senator must be forty years of age and have an income of virtually $2,000. Voters are divided into three colleges, according to income and education. All must be of full age and pay taxes. Those who cannot read and write and have an income of less than sixty dollars a year are grouped into fifties. Each fifty is entitled to select a representative to cast one vote and only one for the entire fifty. Over nine-tenths of the people belong to the Orthodox Greek Church. Catholics, Protestants, Jews, Armenians, and Mohammedans are tolerated.

Rumania is a part of the Roman province of Dacia formed by Trajan in 106 A. D. The name signifies Roman. Although the region has been overrun by Goths, Huns, Bulgarians, Magyars, Slavs, Tartars, and Turks, the Rumanian language is half Latin to this day. The next language element in importance is the Slavic or Russian. The people were converted to Christianity during the eleventh century. Hungary, Russia, and Turkey have striven for the possession of Rumania. In the sixteenth century the Turks took the Rumanians under their protection. In 1802, Russia interfered. Insurrections and revolutions without number resulted finally in shaking off the last vestige of Turkish rule, and the independence of Rumania was proclaimed in 1878.

In 1913, Rumania joined with Greece, Turkey and Servia against Bulgaria in a general scramble for the spoils of the war against Turkey. By the treaty signed August 10, the southwestern frontier was extended to include Turtukai on the Danube and Baltschiki on the Black Sea. In 1916 she joined the allies in the World War.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	122,282
Forest area, acres	18,750,000
Population (1919)	17,393,149
Chief cities:	
Bucharest	345,628
Chisinan	114,000
Cernanti	87,128
Ismail	85,600
Jassy	76,120
Galatz	73,512
Timisioara	72,223
Number of districts	735
Members of senate	170
Members of chamber of deputies	347
National revenue	$1,540,000,000
Bonded indebtedness	$4,000,000,000
Farm area, acres	19,443,800
Wheat, bushels	76,977,000
Corn, bushels	99,036,000
Rye, bushels	8,858,000
Barley, bushels	49,558,000
Potatoes, bushels	3,226,000
Flaxseed, bushels	139,000
Tobacco, pounds	5,370,000
Peas, bushels	247,000
Sugar beets, short tons	16,534
Domestic animals:	
Horses	1,444,232
Cattle	4,771,812
Sheep	6,159,982
Swine	2,444,791
Manufacturing establishments	2,747
Capital invested	$567,459,325
Operatives	157,423
Petroleum, barrels (42 gals.)	8,347,000
Imports	$716,589,000
Exports	$20,578,235
Miles of railway	7,240
Teachers in public schools	13,426
Pupils enrolled	747,463

See TURKEY; HUNGARY; RUSSIA.

Rumford, Count, an American inventor. His original name was Benjamin Thompson. He was born in Woburn, Massachusetts, 1753, and died in Paris in 1814. When a boy he clerked in a store in Salem. In this way, and by teaching school, he maintained himself while studying medicine and physics. In 1770 he taught in an academy at the town of Rumford, now Concord, the capital of New Hampshire. Two years later he married a rich widow of that place.

At the outbreak of the Revolutionary War Thompson was accused of sympathy with the British, was driven from his home and fled to Lord Howe in Boston. When Washington forced the British to leave that city, Thompson was sent to England with dispatches. He there obtained an appointment in the foreign office and was the confidential adviser of the British officials in matters pertaining to colonial affairs. In 1781 he returned to New York and raised a regiment of loyalist troops, known as the King's Army Dragoons, in which he held a command as lieutenant-colonel. He returned to England, however, before the treaty of peace was signed. In 1784 he entered the service of the Duke of Bavaria and became in fact the administrative officer of that kingdom. He reorganized the Bavarian army, suppressed beggary, advocated advanced methods of agriculture, and introduced improved breeds of cattle and horses. He also laid out a city park for Munich. As might be expected, he rose rapidly in the confidence of the Bavarian monarch, who created him Count Rumford, the name being chosen by Thompson himself out of regard for the New Hampshire town in which he formerly lived.

In 1795 Rumford revisited London and was received with much attention by the various learned societies. He was a man of no little scientific attainment. He is credited with having been the first to announce that heat is simply a form of molecular motion. Count Rumford also investigated the problem of draught in fireplaces and chimneys. He was the first to demonstrate that an ascending current of hot air is due to atmospheric pressure. In 1802 he settled at Paris, and two years later married a second wife, the widow of a noted French chemist, Lavoisier. He presented $5,000 to the American Academy of Arts and Sciences, and a similar amount to establish prizes for discovery in heat and light. He also left Harvard a bequest with which the Rumford professorship of physical and mathematical sciences was established.

Ruminants, herbivorous, cud-chewing animals, such as cows, camels, llamas, deer, pronghorns, giraffes, sheep, goats, etc. These animals feed rapidly in the open and afterwards retire to secluded places and begin the process of chewing. The grass which was swallowed and deposited in the first stomach, or paunch, has passed from this compartment into the second, known as the reticulum, and is then returned by a process the reverse of swallowing, up the aesopha-

gus into the mouth. Mastication of the food then takes place. After the cud has been chewed and mixed freely with the saliva it is swallowed and passes into the third stomach, the manyplies, and from thence it passes into the fourth where the process of digestion is further aided by the gastric juice which is there secreted. Among ruminants, the musk-ox and the pronghorns exist exclusively in North America, where the others with the exception of the camel and giraffe also are represented.

See CUD-CHEWERS.

Rump Parliament. See LONG PARLIAMENT.

Runeberg, roo'nĕ-bĕrg, **John Ludvig** (1804-1877), a Swedish poet. He was a native of Finland, but, as he wrote in the Swedish language, he is counted as a Swedish poet. Runeberg was the son of a poor merchant captain. He attended school at Wasa and then went to the University of Abo, where he gave private lessons to pay his expenses. His first volume of poems was published in 1830. It comprises a number of lyrics and one long poem, *Nights of Jealousy.* He was about this time appointed docent at the university now located at Helsingfors, Abo having been burned. He was founder and editor of a successful journal, *Helsingfors Morganblad.* In 1837 he accepted the position of lector at the gymnasium in Borgä, where he subsequently resided. Runeberg published several volumes of poems, and others were published after his death. An epic, *Elgskyttarne* (The Elk Hunters), and *Julqvällen* (Christmas Eve) are among them. As a poet Runeberg's rank is high. His verse is strong and in many instances solemn. Something of the picturesque but melancholy wildness of his native land seems to have crept into his poetry, which shows also deep feeling for the sufferings and the wrongs of his own people. Certain critics mention Runeberg's as the greatest name in Swedish literature. His collected works were published in 1876.

Runes, the early alphabet used by the Teutonic and Gothic nations of early Europe. There were three types, the Norse, the Anglo-Saxon, and the German, differing but slightly, however. There are no books or manuscripts written in runes, but runes have been found on memorial stones, rings, coins, crosses, medals, brooches, and on the hilts and blades of swords, particularly in parts of England, Scotland, Norway, Sweden, Germany and Iceland, France and Spain. It is thought that the runic style of writing was learned from the Greeks about 66 B. C. Writing in Runic characters was understood only by a few, the priests of the heathen gods. The fact that runes could talk caused the common people to ascribe to them a magical power. With the introduction of Christianity runic writing was suppressed as savoring of heathenism. Runes were condemned in Sweden about the year 1001, and in Spain they were officially forbidden by the council of Toledo in 1115. The runic alphabet has been resurrected and pieced together through the efforts of antiquarians. The letters of the English alphabet corresponding to the first six runic characters spell out the word *futhork,* a name by which the runes are sometimes known. See ALPHABET.

Runestone, The Kensington, so called, because found near Kensington Station, Douglas County, Minnesota, in 1898. The inscription thereon in runic characters has been translated as follows:

"Eight Goths (Swedes) and twenty-two Norwegians upon a journey of discovery from Vinland westward. We had a camp by two skerries one day's journey north from this stone. We were out fishing one day. When we returned home we found ten men red with blood and dead, A V M (Ave, Virgo Maria), save us from evil. We have ten men by the sea to look after our vessel fourteen (or forty-one?) days' journey from this island. Year 1362."

There has been much bitter controversy as to its authenticity. The Minnesota Historical Society after a most careful investigation passed favorably upon its genuineness, as have also other authorities. Others are just as positive that it is of comparatively recent origin. It has been taken to Europe and submitted to a number of Scandinavian runologists whose opinions are at variance though generally unfavorable. These question it upon philological grounds solely; all other evidence points to its being genuine. If so, its importance historically is apparent.

Runnymede, or **Runnimede,** a meadow on the south or left bank of the Thames. It is situated in Surrey about twenty-one miles above London and a few miles below Windsor Castle. Runnymede is famous in English history as the place where the powerful barons of King John forced him to sign Magna Charta. See MAGNA CHARTA.

Rupee, a silver coin of India. The name is of considerable antiquity. Rupees of different values have been current in the various provinces of India. The rupee of the present day is rated at a shilling and four pence in English money. It is valued in United States gold at 32.4 cents. The accounts of India are kept in rupees. Roughly speaking, Indian values may be converted into American values by allowing three rupees to the dollar. One rupee equals sixteen annas. One hundred thousand rupees are a lac; 10,000,000 a crore. See COIN; MONEY.

Rupert (1619-1682), a Bavarian prince. Prince Rupert was the son of Frederick V, king of Bavaria, and Princess Elizabeth, the daughter of James I of England. He was educated at Leyden, then the most celebrated university in Europe, and had military experience in the Thirty Years' War. When the Civil War broke out in England Prince Rupert held command in the army of his uncle, Charles I. He won the battle of Edgehill, but lost those of Marston Moor and Naseby. During the period of Cromwell's ascendency, he lived in Paris, carrying on scientific studies. He is credited with the invention of a brass alloy, known as prince's metal and of the glass bulb known in the laboratory as a Prince Rupert's drop. At the restoration of the Stuarts he returned with his cousin Charles II to England. He was one of the original members of the Royal Society of London; also the first governor of the Hudson Bay Company. Rupert's Land in Canada, now a part of the Northwest Territory, was named for him.

Rural Credits, a term applied to the facilities or means whereby the farmer obtains loans or other accommodations to enable him to tide over the period between crops, or to obtain money for needed machinery or improvements. Several acts of Congress in recent years have been directed to the end of making it easier for the farmer to obtain required funds, and Farm Land Banks have been established for this purpose, with an elaborate system of organization and procedure.

Farming is the biggest business in the United States, but the development of modern large-scale business methods and the progress of legislation had been of such a nature up to 1922 as to put the production and distribution of farm products out of line with the rest of the economic structure. A big slump in wheat prices in 1922 called general attention to the financial needs of the farmer, and economists were forced to the belief that such a slump would not have taken place if a proper system of rural credits and cooperative marketing had been in existence; in other words, if the farmer had had the benefit of similar banking facilities to those enjoyed by the rest of modern "big business." It was found that the farmer was laboring under a decided economic handicap. The purchasing power of farm products in 1922, that is, their exchange value in other commodities, was only 64 cents on the dollar as compared with what it was in 1913, and even then it was not equitable.

Millions of good farmers on good land and with good crops were actually in 1922 running their business, through no fault of their own or the mischances of nature, at a loss that spelled ruin if continued. Capital was being impaired and burdensome debts incurred to keep the farms going and the farm people—indeed the whole country—clothed and fed.

This distressing situation was partly due to the general upset of the world during the war and after, but it was aggravated by the weakness of the rural financing and marketing system. The remedy apparently, so far as access to credit was concerned, was to set up an entirely new credit system, to increase the volume of three classes of rural credits, namely: (1) Credit for the more orderly marketing of crops; (2) credit for the purpose of raising and marketing cattle; (3) credit for crop production purposes.

The basis of increased credits for marketing crops should be, according to eminent financial authority, the placing of the

products in a modern warehouse or elevator, where a neutral authority would regulate their grade and amount, and where a certificate would be issued for the amount so stored or warehoused. The farmer, once in possession of this certificate, could obtain credit upon it from a bank, in much the same way as is now done; or a new finance corporation could be established for the purpose of lending money to the farmer, at the lowest obtainable rate of interest, for not exceeding one year, upon his note, secured by this certificate, representing marketable commodities. Such a new institution—of the kind contemplated by recent legislation—would place the farmer's note, secured by his products, in its treasury, and issue its own obligations, as has been done by the Federal Land Banks in their field. The paper so issued, under the recent laws, is discountable in the Federal Reserve system, when its maturity is within nine months.

In the matter of rural credit for production, the character and individuality of the farmer—what bankers call the moral risk—must be considered, because here there is not collateral of unquestioned value and marketability, as in the case of crops and cattle. Heretofore the country banks and merchants have furnished this sort of credit. But the new financial associations open to the farmer are designed to give him as free access to the credit markets of the world as other producers enjoy, so that he shall not be confined necessarily to local markets. Under the new plan the procedure is somewhat as follows: The farmer, if he cannot borrow from the usual banking facilities, goes to his local credit organization. If it decides to lend him money, it takes his note, indorses it and passes it on to a regional institution, which in turn places the local body's note in its treasury and issues its own obligation against it for sale in the credit markets of the world. This latter paper is discountable in the Federal Reserve Bank system when its maturity is within nine months.

When the present plans for rural credits are fully worked out, there will probably be one central organization in each agricultural section of the country to serve as the agency for all three of the classes of credit referred to above, namely, for more orderly marketing of crops, for the raising and marketing of cattle, and for productive purposes. The final arbiters of how much money can be raised for rural credits, however, will be the investing public, banks and bankers, whose ability to furnish money by buying the notes for debentures is greater even than that of the government itself. They are entitled to know what they are buying, so that orderly marketing, cattle raising, and production will each bear its just share of interest charges.

The new credit institutions for the farmer's benefit will not be a panacea for all the farmer's ills, and indeed in practice may not be used as much as is anticipated by the authors of the new rural credit acts. But their potential credit-providing facilities will be there to operate powerfully as a restriction of practices of which the farmer has complained, and to furnish quick relief in times of widespread credit stringency such as have been experienced in the post-war period. With the Federal Reserve Bank system as the backbone and support of our financial structure, the special rural credit institutions should have a great influence in restoring the confidence of the farming industry.

In considering the farmer's financial problems, however, one must have in mind the fact that no matter what credit facilities, no matter what transportation and other distributive agencies may be provided, there must be a market. The farmers are the real exporters of the United States. In the end the price of all products is set by the price of the surplus. In the farmer's case, this means that the price of his entire crop is largely set by the price he gets for the exportable surplus. It is true that in 1922 large quantities of our products were exported, but they were paid for, in the first place, by the sale in the United States during the first six months of the year 1922 of some $600,000,000 worth of bonds issued by foreign countries at the highest rates of interest ever known in the history of international finance; secondly, by the sale of foreign jewels, pictures, heirlooms and other treasures. This money has been used to feed and clothe the populations paralyzed by post-war difficulties. There is

nothing so important to the American farmer now (1923), nothing that so directly affects his credit, as the full reestablishment of his foreign markets, which can come only from reestablishment of the world's economic peace and balance.

In the last hours of the Sixty-seventh Congress, which expired March 4, 1923, two agricultural bills, introduced by Senator Capper of Kansas and Senator Lenroot of Wisconsin respectively, were rather hurriedly put together and passed under the title of the Agricultural Act of 1923, together with certain amendments to the Federal Reserve Act making the newly authorized agricultural credits rediscountable upon certain terms at the Federal Reserve banks, and providing for the admission to the Reserve System of State banks having a paid-up capital of not less than $15,000 upon condition that the capital shall be increased to the required minimum, $25,000, out of earnings.

The Lenroot and Capper bills were joined practically as independent measures, and their provisions are administered separately, those of the Lenroot bill under the Federal Farm Loan Board, and those of the Capper bill under the Comptroller of the Currency. The Lenroot system establishes twelve Federal Intermediate Credit Banks, as adjuncts to the existing Federal Farm Land Banks. The officials of the Land Banks are to be the officials of the new institutions and direct their operations; but while these institutions are modeled closely after the Land Banks, they are entirely independent in capital, assets and liabilities. Instead of lending upon farm-land security, and making such loans the basis of debenture bonds, the new banks are to lend upon paper based on personal or corporate credit, supported by indorsements, warehouse receipts, chattel mortgages, etc., and make such paper the basis of debentures.

The capital of these Intermediate Credit Banks is to be $5,000,000 each, supplied by the Treasury of the United States; the Secretary of the Treasury being instructed to subscribe for the stock. The banks will not do business with individual borrowers, but with National or State banks, savings banks, loan associations, cooperative credit or marketing associations of agricultural producers, and other similar corporations.

The credit organizations contemplated by the Capper bill, adopted as part of the Agricultural Act of 1923 are called National Agricultural Credit Associations. They are to be organized under and supervised by the Comptroller of the Currency, like National banks, including examinations by National bank examiners, or similar officers directed by the Comptroller. The class of business these Credit Associations are authorized to do is practically the same as that to be done by the Intermediate Credit Banks, except that while the latter may take paper (notes, etc.) ranging in maturity from 6 months to 3 years, these Credit Associations are restricted to accepting paper running not more than 9 months from the time of purchase, except where secured by mortgage on live-stock, when the paper may run 3 years. The associations may issue collateral trust debentures, and pledge the paper which they have purchased. They may charge interest rates not in excess of the legal rates in the states in which they operate.

The new legislation was intended, of course, to benefit the farmers by increasing facilities for agricultural credit; but it is a curious circumstance that this special legislation should be carried through with great acclaim by the leadership of a group in Congress that at the very same time was proclaiming its virtuous intention to do away henceforth with all class legislation. There is much to be said against voting aid out of the Treasury for any class of business. Of course, the farmers believe that aid for agriculture will benefit everybody, but no measure of government aid was ever offered for which the same argument was not urged.

Rush, Benjamin (1745-1813), an American physician and patriot. He was a native of Philadelphia and died there. He was graduated at Princeton in 1760 and completed a course at the University of Edinburgh in 1768. At the outbreak of the Revolutionary War he was professor of chemistry in the College of Philadelphia. He was an ardent advocate of American rights—a coworker with Franklin. He was

one of the signers of the Declaration of Independence, a member of the convention which framed the United States Constitution, and a member of the Pennsylvania legislature which ratified that Constitution in 1787. During the Revolutionary War he was appointed surgeon-general and had general charge of the hospital service. On the return of peace he resumed his practice and professorship at Philadelphia. Later the college with which he was connected was merged with the University of Pennsylvania in which he became professor of medicine and clinics. He was one of the foremost practitioners of the United States. He won quite a reputation by his treatment of yellow fever. Like his friend, Benjamin Franklin, he was a scientific inquirer, and was a member of various learned societies. He advocated the abolition of slavery. He was connected with the United States mint at Philadelphia from the time of its establishment until his death. See HOSPITAL; MEDICINE.

Rush, a plant with a tough, flexible, cylindrical stem, belonging to the family of sedges. Some two hundred varieties are known under various names, such as horsetail rush, bulrush, flowering rush, etc. In general the stems are often barren of foliage. The leafless species has flowers closely resembling leaves. The plants grow in marshes, swamps, and low pasture lands, and are an obnoxious weed to farmers. The stems are used for chair bottoms, mats, ropes for binding, baskets, etc. The rush-light is a candle made from the stem, the green rind being stripped from all sides but one, and the exposed pith made into a rude wick by being dried and dipped in grease. Rushes, like leaves, formerly took the place of carpets, and were strewn on the floors of churches, stages, and private dwellings.

Rush Medical College, an affiliated college of Chicago University. It was chartered by the legislature of Illinois in 1837. The governor of the state, the lieutenant-governor, and the speaker of the House of Representatives are members of the governing board. The present relationship was entered into in 1898. The course consists of four years, two of which are taken in the college of arts and two in the medical college. The institution is coëducational. There are over a thousand students, many being physicians of experience engaged in research.

Rush, William (1756-1833), a sculptor who reecived his early education in Philadelphia, where he was born. At an early age he was apprenticed to a carver, who taugh him the art of making figure-heads on vessels. His talent was very evident, and after he had decorated several large ships, including the *Constellation* and the *United States,* the artistic world took note of his graceful and life-like productions.

Due to the fact that he worked exclusively in wood or clay, most of his works have disappeared, but a few of them still survive. A statue of George Washington, in full-size, still reposes in Independence Hall, Philadelphia.

Mr. Rush's influence upon the artistic appearance of his native city was great. He impressed upon the minds of the people a love of the beautiful and the artistic which has continued to this day.

Rusk, Jeremiah McLain (1830-93), an American soldier and agriculturist whose military ability was noted during the Civil War. He was born in Ohio, and when a youth removed to Wisconsin, which was his home at the time of the outbreak of the Civil War. He immediately enlisted, formed an army of goodly size, and received the rank of major; he was raised to lieutenant colonel after the battle of Vicksburg. His dauntless spirit was manifest in the Meridian campaign under Sherman, and won him the rank of brigadier general.

After the war he became prominent in Wisconsin politics, serving as congressman and governor. During the administration of President Harrison, he was appointed Secretary of Agriculture, which position he filled with credit.

Rusk, Thomas Jefferson (1802-56), an attorney and soldier born at Camden, South Carolina and educated for the bar. After spending several years under the tutelage of John Calhoun, he practiced his profession in Georgia and later in Texas. In the latter state he became a member of

the convention which succeeded in making an independent government of Texas in 1836, and he held the offices of Secretary of War and commander-in-chief of the Texan military body after the accomplishment of this goal.

Ruskin, John (1819-1900), a famous English art critic, author, and reformer. His father was a London wine merchant—an honest man of Scottish ancestry. When Ruskin was a young lad, small enough to sit on a bracket in front of his parents, he accompanied them in a chaise every summer, making the rounds of his father's customers. In this way he traveled through England, Wales, and the southern half of Scotland. He was educated at home or under private tutors. As we learn from *Praeterita,* an autobiographical work from Ruskin's own hand, his favorite books were Scott's novels, Pope's *Dunciad, Robinson Crusoe,* and *Pilgrim's Progress.* He attended lectures at King's College, London, and was sent to Christ's College, Oxford University. His first writing for publication consisted of essays for *Loudon's Magazine of Natural History* and the *Architectural Magazine.* The bit of writing by which he is known best to young people is *The King of the Golden River.* It was written in 1841 for a little girl friend. In 1848, when she was nineteen and he twenty-nine, they were married. Finding later that their domestic life was unhappy, and that he was not a real husband, he consented to the annulment of their marriage and her marriage to a young painter by the name of Millais.

At the conclusion of his university course Ruskin was of the opinion that he should devote himself to painting. He took lessons under the ablest instructors of the day, including Copley Fielding. In 1843 he began giving to the press a series of volumes entitled *Modern Painters.* They were signed "A Graduate of Oxford." In these volumes, which attracted immediate attention, he entered upon a brilliant defense of the work of recent painters, especially Turner, declaring it superior to that of the ancient masters. His work grew into a general exposition of the principles that underlie the art of painting. It won reputation for its author and recognition for the painters of the day, and is considered still a standard work on the subject. It is full of passages of great power and beauty, and thoroughly established the writer's reputation as a man of letters.

When a child, Ruskin was fond of watching carpenters and stone masons at work. During his travels through England he had opportunity to study the most noted cathedrals and other buildings. He traveled extensively on the continent, especially in Italy. In 1849 he began writing on architectural subjects. His *Seven Lamps of Architecture* is a systematic exposition of the principles that underlie the builder's art. These principles, which he called the "Seven Lamps," are sacrifice, truth, power, beauty, life, memory, and obedience. By sacrifice is meant, for instance, the expenditure of wealth. In his judgment a building must be rich to be architectural. This work was followed by *The Stones of Venice* in 1851, and *The Elements of Drawing* in 1857. *Sesame and Lilies,* a precious little volume in which he gives his ideas of reading and education, appeared in 1864. *The Ethics of the Dust, Crown of Wild Olive,* and *Queen of the Air* followed soon after. Other works that should be mentioned are his *Architecture of Venice, The Harbors of England, Proserpina, Studies of Wayside Flowers, Arrows of the Chace, On the Old Road,* etc. In 1878 he broke down under an attack of brain fever. With the exception of *Praeterita,* already mentioned, his writings came to an end.

About this time, when Ruskin was at the height of his fame, his father died, leaving him an independent fortune. His attention had been attracted gradually to the social conditions prevalent in England. His sympathies were aroused by the wretched condition of working people. He professed to be much indebted to the writings of Carlyle. Like Carlyle, he was a violent Tory. He believed that it was the duty of working people to be industrious, economical, temperate, and obedient, leaving to the so-called higher classes the duties of government. He believed it unwise to give poor men the right to vote or a voice in the election of members of Parlia-

ment. In 1871 he began writing *Fors Clavigera, or Letters to the Workingmen and Laborers of Great Britain.* For the next ten years he continued writing, until about 1885. From this time on, improvement in the condition of workingmen occupied the greater part of his thought. He invested $35,000, a tenth of his entire property, in a scheme known as the Guild of Saint George, under which name he started some experiments in agriculture and manufacturing. It was his design to rescue poor people from the slums of the large cities, and to employ them in helpful occupations in the country. Beyond showing his sympathy and arousing public interest, his plans came to little.

During his lifetime Ruskin held a number of educational positions. He lectured on art at Cambridge and at Oxford. In 1871 he was gratified by an honorary election to the rectorship of the University of St. Andrews, Scotland. Although not a practical man in the sense of being able to make one dollar earn another, Ruskin was without doubt one of the greatest men of his century. His writings are pervaded throughout by a spirit of purity, sincerity, and unselfishness. Like Carlyle, he was a foe to all pretense, whether in painting, sculpture, literature, or society. Ruskin lived too much by himself, too exclusively in the world of art and literature, to be able to suggest practical plans for the betterment of the homes and lives of laboring people, but it would be difficult to name a writer who has done more to elevate and purify human thought. One can scarce read a page of Ruskin chosen at random without finding himself possessed of greater determination to do the right thing by himself and his fellow men. As a writer of English prose Ruskin is unsurpassed. Words are his servants. They say exactly what he would have them say, no more, no less. No writer combines such beauty of imagination with such directness and simplicity of style.

SAYINGS OF RUSKIN.

Conceit may puff a man up, but never props him up.

Life without labor is guilt; labor without art is brutality.

In mortals, there is a care for trifles, which proceeds from love and conscience, and is most holy; and a care for trifles, which comes from idleness and frivolity, and is most base.

Of all God's gifts to the sight of man, color is the holiest, the most divine, the most solemn. We speak rashly of gay color, and sad color is in some degree pensive, the loveliest is melancholy, and the purest and most thoughtful minds are those which love color the most.

There was a rocky valley between Buxton and Bakewell, once upon a time, divine as the Vale of Tempe; you might have seen the gods there morning and evening—Apollo and all the sweet muses of the Light—walking in fair procession on the lawns of it, and to and fro among the pinnacles of its crags. You cared neither for gods nor grass, but for cash (which you did not know the way to get); you thought you could get it by what the *Times* calls "Railroad Enterprise." You enterprised a railroad through the valley—you blasted its rocks away, heaped thousands of tons of shale into its lovely stream. The valley is gone, and the gods with it; and now, every fool in Buxton can be at Bakewell in half an hour, and every fool in Bakewell at Buxton, which you think a lucrative process of exchange.

"Pay good and bad workmen alike?" Certainly. The difference between one prelate's sermons and his successor's—or between one physician's opinion and another's—is far greater, as respects the qualities of mind involved, and far more important in result to you personally, than the difference between good and bad laying of bricks (though that is greater than most people suppose). Yet you pay with equal fee, contentedly, the good and bad workmen upon your soul, and the good and bad workmen upon your body; much more may you pay, contentedly, with equal fees, the good and bad workmen upon your house.

"Nay, but I choose my physician and (?) my clergyman, thus indicating my sense of the quality of their work." By all means, also, choose your bricklayer, that is the proper reward of the good workman to be "chosen." The natural and right system respecting all labor is, that it should be paid at a fixt rate, but the good workman employed, and the bad workman unemployed. The false, unnatural, and destructive system is when the bad workman is allowed to offer his work at half price, and either take the place of the good, or force him by his competition to work for an inadequate sum.

For all other rivers there is a surface, and an underneath, and a vaguely displeasing idea of the bottom. But the Rhone flows like one lambent jewel; its surface is nowhere, its ethereal self is everywhere, the iridescent rush and translucent strength of it blue to the shore, and radiant to the depth.

Fifteen feet thick, of not flowing, but flying water; not water, either,—melted glacier, rather one should call it; the force of the ice is with it, and the wreathing of the clouds, the gladness of the sky, and the continuance of time.

Waves of clear sea are, indeed, lovely to watch, but they are always coming or gone, never in any

taken shape to be seen for a second. But here was one mighty wave that was always itself, and every fluted swirl of it, constant as the wreathing of a shell. No wasting away of the fallen foam, no pause for gathering of power, no helpless ebb of discouraged recoil; but alike through bright day and lulling night, the never-pausing plunge, and never-fading flash, and never-hushing whisper, and, while the sun was up, the ever-answering glow of unearthly aquamarine, ultramarine, violet-blue, gentian-blue, peacock-blue, river-of-paradise blue, glass of a painted window melted in the sun, and the witch of the Alps flinging the spun tresses of it forever from her snow. There were pieces of wave that danced all day as if Perdita were looking on to learn; there were little streams that skipped like lambs and leaped like chamois; there were pools that shook the sunshine all through them, and were rippled in layers of overlaid ripples, like crystal sand; there were currents that twisted the light into golden braids, and inlaid the threads with turquoise enamel; there were strips of stream that had certainly above the lake been mill streams, and were busily looking for mills to turn again.—*Geneva and the Rhone.*

Russell, Bertrand Arthur William (1872-), an English mathematician and philosopher, was born at Chepstow and educated at Trinity College, Cambridge, graduating with honors. He accepted a lectureship at Cambridge and soon became well known as an exponent of mathematical philosophy. In 1896 he published *German Social Democracy* and in the following year *Essay on Foundations of Geometry.* These were well received, but Mr. Russell published nothing more until 1903, when his *Principles of Mathematics* appeared.

Because he took a vigorous stand against the British government and identified himself with the conscientious objectors during the World War, Mr. Russell was arrested, tried and fined and was deprived of his position as lecturer at Cambridge. In 1914 he published *Our Knowledge of the External World,* and this was followed by *Principles of Social Reconstruction, Mysticism and Logic, Proposed Roads to Freedom, Introduction to Mathematical Philosophy, The Theory and Practice of Bolshevism* and *The Analysis of Mind.*

Russel, Lord John, First Earl Russell (1792-1878), a noted English statesman who was twice Prime Minister. He was born in London, third son of the sixth Duke of Bedford, and educated at Westminster School and at Edinburgh University. Elected to Parliament in 1813, Lord John at once came into notice as a Parliamentary reform advocate. In 1828 he carried the repeal of the Test and Corporation Acts, and supported the Catholic Emancipation Act of 1829. In 1832 he rose to prominence through his connection with the Reform Bill. After serving as Home Secretary for four years, Lord John became Premier in 1846, remaining in office for six years.

During his administration he changed the attitude of Ireland from one of near rebellion to one of greater satisfaction with British rule than had been prevalent for years. Chartism and the attempt at Roman Catholic reëstablishment in England were two important questions that arose during his term of office. In 1852 he was defeated, and from that year until after 1855 he served as Foreign Secretary, and was raised to that office again in 1859. He displayed hearty sympathy for the Italians who were fighting for unity; and his attitude towards the *Alabama* affair during the American Civil War amounted to a violation of British neutrality. Raised to the Premiership again in 1865, he resigned in 1866 because of the defeat of a Parliamentary reform bill. His entire later life was devoted to literary work.

Russell, Lillian [Nellie Leonard], (1861-1922), one of the best known American actresses, was born at Clinton, Iowa. Miss Russell's first appearance on the stage was in Brooklyn in the chorus of a Gilbert and Sullivan opera; she was then eighteen years old. Her charming personality and lovely voice brought her almost immediate recognition, and she soon became known as America's foremost comic opera star. Among the extravaganzas in which she appeared and sang leading roles were *The Pirates of Penzance, Billee Taylor, Olivette, The Sorcerer,* and the *School for Scandal.* After twenty-five years of musical comedy, Miss Russell made her début as comedienne in *Barbara's Millions,* in Grand Rapids. This venture, however, was not a success. She later appeared in *Wildfire,* winning much praise.

Miss Russell was married four times, her last husband being Alexander P. Moore, the owner and publisher of the Pittsburgh *Leader,* Pittsburgh, Pa., this marriage taking place in 1912. She then abandoned

the stage and became interested in welfare work among the laborers' families in Pittsburgh. She succeeded so well in this that she was appointed a special investigator by President Harding to study emigration conditions in Europe. She sailed for Europe in January, 1922, and traveled through Germany, France and Italy, returning in March, after two months' study and research. She made a report to Secretary Davis, recommending that American consuls be empowered to conduct physical examinations, with a view to barring out undesirable aliens, and that the United States put a stop to immigration for five years in order that it might recover its balance and assimilate those already in the country. She afterwards made numerous addresses before civic bodies on the question of immigration.

Russell Sage Foundation an institution established in 1907 by Mrs. Russell Sage "for the improvement of social and living conditions in the United States of America." Ten million dollars of the Russell Sage fortune were set aside for the purpose, and the Foundation was divided into departments of charity organization, child welfare, remedial loans, recreation, education and surveys and exhibits.

Each of the departments has an official and separate publication, and each has its distinct work to do. One department deals with defective, dependent, delinquent and neglected children; the recreation department seeks to promote physical and mental vigor by establishing playgrounds, supervising sports, etc., and by promoting the use of school buildings as centers of social activity. One of the most ambitious projects of the Foundation was the building of an ideal residential suburb—Forest Hills Gardens—on Long Island, where attractive homes are rented to the poor at nominal rates. The headuarters of the Foundation are in New York City.

Russia, Republic of (officially, Russian Socialist Federated Soviet Republic), comprises the greater part of what was formerly the Russian Empire, a vast sweep of territory that reaches from the Baltic Sea to the Pacific Ocean, and from the Arctic Ocean to the Black Sea. In 1917, when czardom was destroyed, Russia had an area of 8,764,586 square miles and a population of 182,182,600. On June 1, 1923, the area was estimated at 8,166,130 square miles and the population (1921 estimate) at 131,546,065. The decrease in area is accounted for by territorial losses consequent upon the declaration of independence of several provinces that were formerly integral parts of Russia; decrease of population is partly due to the above and partly to Russia's losses in killed during the World War, her losses being the heaviest among the allied nations, and to devastating famines.

In western Russia have arisen the five independent republics of Esthonia, Poland, Lithuania, Latvia and Finland (all of which see). Other states, such as Georgia and Azerbaijan enjoy a semi-independence. Siberia, with an area of more than 4,800,000 square miles, is separately administered. Soviet Russia proper has an area of 1,290,440 square miles, and the inhabitants number 65,751,898. The latter will be the Russia of this article, since the other states and dependencies are given separate treatment in these volumes.

THE PEOPLE. The present inhabitants of Russia may be divided into three distinct nationalities—Great Russians, Ukrainians and White Russians. Of these the Great Russians are numerically preponderant, while the White Russians are the least numerous. Since 1914 the decline of Russia's population has been steady, due largely to famine and the diseases attendant thereupon, and to emigration caused by the civil war. The famine that gripped the country after 1920 was one of the worst, if not the worst, that has ever occurred in the history of civilization.

SURFACE AND DRAINAGE. The eastern and southern border is occupied, from the Black Sea to the Urals, by mountain chains, spurs, foothills and intervening plateaus, that divide Europe from the sunken area of the Aral and the Caspian. Otherwise the surface of Russia consists of vast unbroken plains. The greatest elevation within the plains region is the Valdai Hills, south of Petrograd, and they attain a height not to exceed 1,000 feet. A low watershed, hardly noticeable and not exceeding 500

feet in altitude, runs eastward from the Valdai Hills to the Ural Mountains. The western slope of the Urals is gradual. The great rivers rise in the Valdai Hills. The drainage basins are four, the Arctic, the Baltic, the Black Sea and the Caspian. North of the divide, the rivers take their way to the Baltic and its arms, or they wind slowly between low banks to the Arctic Ocean. The principal river of the Baltic basin is the short and phenomenal Neva. The Dwina is the greatest of the Arctic rivers. The Büg, the Dnieper and the Don flow southward into the Black Sea. The Volga, the longest river in Europe, finds its way from the Valdai Hills by a wide sweep to the northeast, and by easy stages to the Caspian, which receives also the waters of the Ural.

MINERALS. The mineral wealth of the empire is found in the region of the Ural Mountains. Platinum, gold, silver, lead, copper, iron, rock salt, diamonds and precious stones occur here. Coal is found in abundance in the vicinity of Moscow and north of the Sea of Azov. Astrakhan is noted for saltpeter. The Caucasus region, especially the country about Baku, is celebrated for the production of naphtha and petroleum. For many years Russia has been the world's third petroleum producer, despite the fact that her mineral oil resources have not been fully exploited. This country is normally the world's greatest source of platinum; the iron deposits are extensive and have not been fully developed; and other mineral deposits—especially those in the Ural Mountains—will, when Russia again becomes economically stable, be large factors in her industrial life.

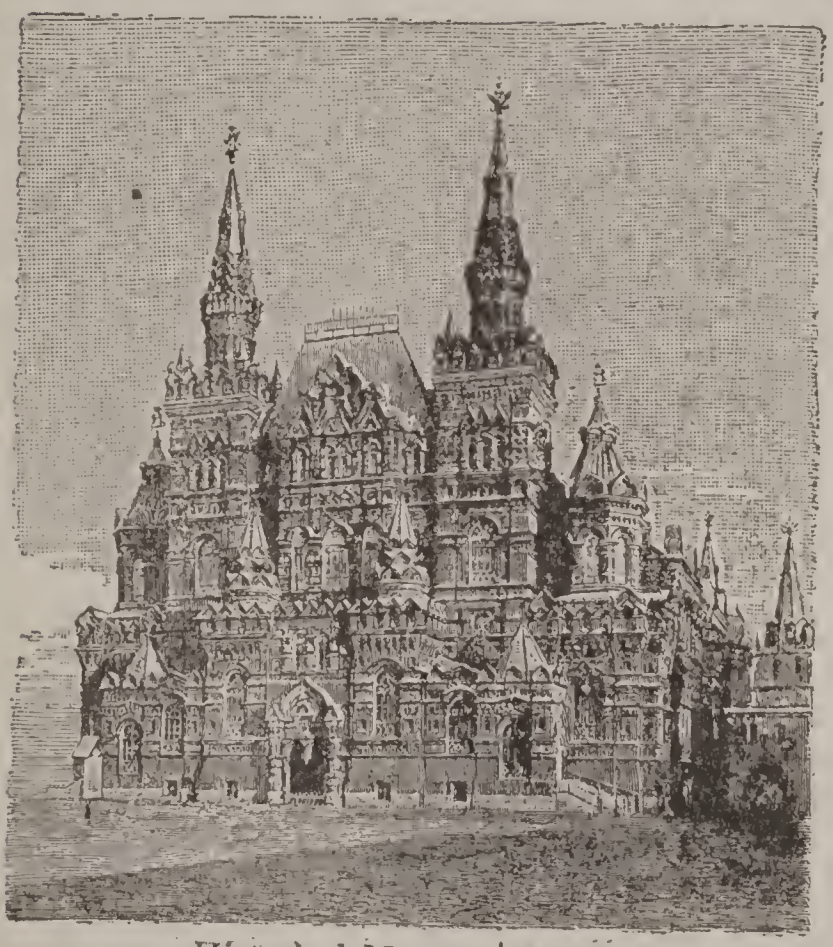
CLIMATE. It is difficult to characterize the climate of so extensive a region. If we include the Crimea we may say the variations of Russian climate are similar to those experienced in passing from the Gulf of Mexico through the United States and Canada to the Arctic Ocean. Owing to the great extent of land surface, the climate is essentially continental, that is to say, the summer heat extends far northward and the cold winter far southward. The Sea of Azov freezes over usually about the first of November and remains frozen until April. There is scarce a locality in Russia where the thermometer does not range through a 100° F. The range at Archangel on the White Sea is from 84° to 33°. At Moscow the limits are 88° above to 22° below; at Odessa on the Black Sea, the range is from 89° above to 3° below. The summer is warm everywhere. Autumn frosts begin to fall along the Arctic in August. They reach the Black Sea by the first of October. The Arctic streams freeze up early in November. The Volga and the Don are continuous pathways for sledges by the middle of December. Winds are higher and more prevalent than in the more broken and oceanic sections of western Europe. Terrific winter dust storms occur in the southeastern steppes, and blizzards are frequent in the north. The dryness of the atmosphere increases toward the eastward. On the shores of the Baltic, the rainy and snowy days average about 150 a year, the total precipitation being about twenty inches. Near the Caspian about seventy days of snow and rain are to be expected, with a precipitation of about fourteen inches.

FLORA. Aside from a small area in the Crimea, which has a climate and a flora comparable with that of the north Mediterranean coast, European Russia may be divided into three floral regions, the Arctic, the forest and the steppe regions. The Arctic region is largely tundra. Wide swamps are occupied by mosses. The largest plants are dwarf willows and dwarf birches. Fewer than 300 flowering plants are known. The southern limit of the region varies from the sixty-eighth to the seventy-first parallel. South of the Arctic lies the forest region. The northern side of the forest belt is characterized by the birch, the poplar, the alder and by coniferous trees, including the fir, the pine and the tamarack. The southern side is dominated by the oak, the ash, the maple, the basswood, the elm and other well known deciduous trees. There are in all about 1,600 flowering species in the forest region. South of the forests lie the steppes—prairies, we would call them. They are grassy, but, save trees and shrubs along the shores of

Priest.

Peasant woman.

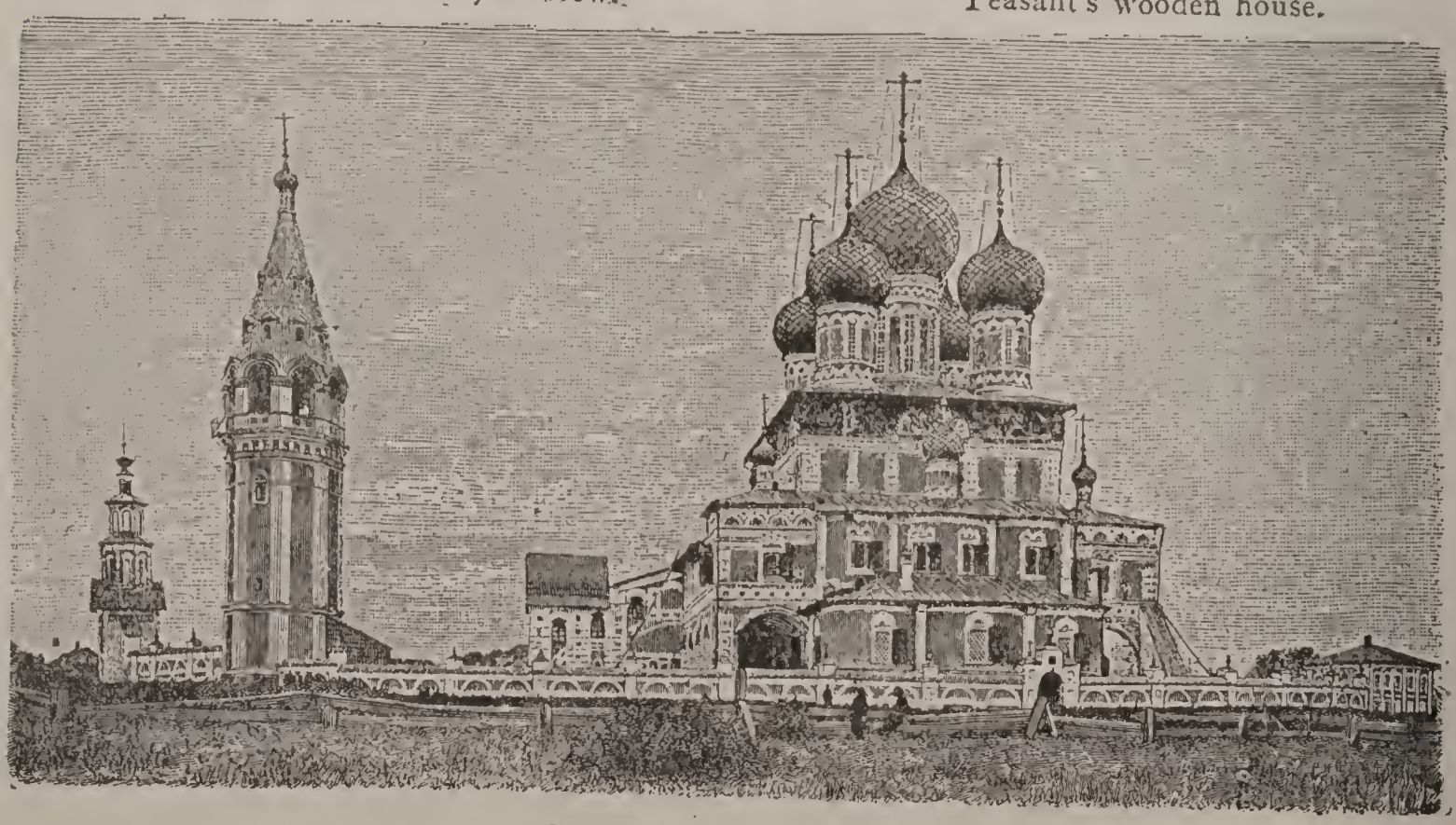
Laborer.



Historical Museum, Moscow.

Three-horse troika.

Peasant's wooden house.



Cathedral of Borissogliebsk.

RUSSIAN CIVILIZATION.

streams, and thickets in nooks of the valleys, the steppes are treeless. Enough shrubs, grasses and prairie plants are found in the steppe region to bring the total number of Russian species of flowering plants above 3,000.

FAUNA. The wild animals follow the plants in their range. In the north the reindeer, the lemming, the ptarmigan and the grouse-fox are characteristic. The plover and the snipe, the gull, the duck, the wild goose and the diver, all of species without number, make the north their breeding grounds. In the forest region, the weasel, the fox and the hare are common; the wolf and the bear are less so. The sable, the beaver, the otter, the lynx, the badger, the elk, the reindeer, the European bison and the wild boar are to be found only in special localities. Birds are numerous. Over 300 species, including the partridge, the quail, the lark and the rook, nest in the forest region. The steppes are characterized by grouse and ground squirrels and smaller birds corresponding closely to the birds of American prairies. Insect pests abound. The fish of the Black Sea are those of the Mediterranean; the Caspian and the Volga are famous for sturgeon.

SOILS. About one-fourth of European Russia consists of lakes, swamps and sands unfit for cultivation. A third is occupied by forests. Deducting these areas and semi-arid sections, fit only for light grazing, scarce over a fifth of Russia is available for cultivation. As to agriculture, five belts running east and west are recognized. They are: the tundras, unfit for human habitation; the northern forests, home of the trapper and the hunter, fertile in localities; the forest region, partly cleared, diversified and attractive; the black earth region, comprising 150,000,000 acres of deep black loam, extending from the Hungarian frontier to the Urals; and the steppes, varying from fertile clays and black sections of land fit chiefly for grazing. The varying quality of the soil is denoted by the varying density of the population. The Arctic region will maintain one inhabitant on each square mile. The steppe region north of the Caspian will support thirteen people to the square mile. The black earth belt normally supports from 200 to 350 people to the square mile.

AGRICULTURE. The people of Russia are preponderantly rural, and agriculture is the mainstay of the country. Until the revolution the greater part of all the land was in large estates, upon which the peasants labored in literal serfdom, but with the return—partial at least—of the land to the people, this condition has been changed. The soil and climate of the extreme north preclude the growing of crops, but in the black earth region farther south almost all temperate zone fruits and cereals thrive. The great crop is wheat; this is followed by rye, sugar beets, barley, flax, hay and potatoes.

In the south great herds of cattle and horses are pastured, and swine, sheep and goats are raised. Wool and hides are, in normal years, important items in Russia's export trade.

After the inauguration of the Lenine regime all possible aid in the way of improved agricultural implements and machinery and literature on agricultural science was given the peasants, but the general instability has resulted in agricultural backwardness.

FISHERIES. Russia's fishing industry has always been important and will continue so. Along the northwest coast the principal catches are salmon, sturgeon, cod and other varieties of food fish. The caviar exported from Russia commands the best prices in the European markets. The Caspian Sea and the rivers that flow into it are the other important fishing centers.

MANUFACTURES. Judged by general European standards, Russia has never been a heavy manufacturer, but it must be said for the new regime that it has done all that almost chaotic conditions would allow to make the country self supporting in the matter of manufactured articles, from the smallest to the largest.

Many commodities for home consumption are made in the peasant homes during the long winters; but in the large cities there are permanent industrial populations engaged in producing for the foreign market. The peasants make such things as

linen, woolen and leather goods, woodenware, hats, household utensils, earthernware, etc., while the factories of Petrograd, Smolensk, Tula, Moscow, Bialystok, Ivanovo, Vladimir, Tver and Shuya produce silk, cordage, steel rails, light and heavy machinery, carpets and rugs, cotton goods, samovars, glass, porcelain ware, tobacco products, sugar, and a host of other articles. Ship building and the chemical industry occupy large numbers of people.

TRANSPORTATION AND COMMERCE. For all the centuries of its existence, Russia has depended upon its rivers for transportation. The latest available estimate gives 289,000 miles as the length of navigable waterways; this total includes several hundreds of miles of canals. the Dnieper, Neva and Volga are the most important rivers, and the Black, Caspian and Baltic seas are commercial outlets. Astrakhan, Novorissisk, Sebastopol, Petrograd, Reval, Liban, Vladivostok and Rostov are the leading seaports.

The railway mileage is estimated at 29,909. The Trans-Siberian Railroad is the largest system in Greater Russia, and though it was formerly poorly equipped, it has lately been improved. Northern Russia has the poorest and fewest railroads and highways, southern Russia the most. Moscow is the leading railroad center. In winter the level plains are snow covered, and the horse drawn sleigh and sledge are used for transport.

Russia is the commercial middle ground between Europe and Asia. Great Britain is the leading market for Russian exports, which consist of barley, flax, tobacco, paper and manganese ore. The United States exports agricultural machinery, cotton and copper to Russia. From the Orient the country receives raw silk, tea, cotton and spices.

EDUCATION. After 1917 the Russian government made several attempts to reorganize—or re-create—the educational system. The leading idea was the stressing of such scientific subjects as could immediately be turned to account for the general good. The church was disestablished, the government took control of the schools, and ideal plans of educating the youth of Russia were drawn up. But for several reasons—the first economic and the others referable to the first—the plans went awry. One system after another failed, but the government has not by any means given up.

The government took over the state theaters, the Academy of Arts, the Imperial Music Society and various other art and music schools, together with all institutions of primary, secondary and higher education.

In 1920 there were 90 one year pedagogical schools, 154 three year pedagogical schools and about 60 higher pedagogical institutions. Many universities have been established to supplement those that existed before the revolution, and the number of elementary and secondary schools increased from 63,317 in 1919 to 91,500 in 1921. On the whole, educational advantages have been greatly extended, even though systems, as such, have failed to work. Official figures show that illiteracy has decreased steadily since 1918.

GOVERNMENT. The constitution under which Russia is governed was adopted by the fifth All-Russian Soviet Congress. The instrument was published in 1918 and since then has been amended several times. It provides for the nationalization of land, forests, mines, waters and other sources of national wealth. The essence of the constitution is that it favors the peasant and laboring class in all matters from education to the right to defend the country with arms. Russia is, politically, an agglomeration of soviets, or committees; these soviets are units of local authority, and the All-Russian Central Executive Committee is the supreme authority in the land. The committee comprises 300 members, elected by the All-Russian Congress of Soviets. This Central Executive Committee has been accused by the press of the world with innumerable "crimes," and the charge has always been answered by "political necessity." The Central Committee forms a Council of Peoples' Commissaries, numbering 18, for the administration of Russia's affairs. Suffrage is

THE NATIVES OF RUSSIA-IN-EUROPE

1. A Peasant Woman
2. A Coachman
3. A Nurse
4. A Characteristic Peasant's Cottage in the Heart of Russia

enjoyed by all who have reached the age of 18, regardless of sex, nationality, religion or residence, the one stipulation being that he who votes must gain a livelihood by productive labor. Moscow is the seat of government.

EARLY HISTORY. The history of Russia has been one of expansion. The Russians are a Slavonic people. They came into notice about the head waters of their great river, the Volga, at the beginning of the ninth century. About 862, under a Scandinavian prince, they made Novgorod their capital. Two decades later their center was at Kiev. During the tenth century they came into conflict repeatedly with the Byzantine empire. Christianity was introduced under Vladimir about 972-1015. Kiev was for centuries the capital. During the thirteenth century the Russians were overthrown by the Mongols and became tributary to the Khans. The first Russian principality to shake off the Mongol yoke was Moscow. It became the capital about 1480. The work of driving off or subjugating the Mongols proceeded from that city as a center. Novgorod was recovered in 1478. Astrakan was acquired in 1544. During the sixteenth century the Cossacks and the western portion of Siberia came under Russian rule. The acquisition of Siberia continued during the seventeenth century. The title of czar was assumed by the princes of Moscow in 1547. In the first part of the eighteenth century Peter the Great extended his domains at the expense of the Swedes and Turks. The acquisition of Finland began in 1743 and was completed in 1809. The absorption of Russian Poland took place between 1772 and 1795. The Crimean region was annexed in 1783. The close of the century witnessed the annexation of more territory at the expense of Turkey. During the early part of the nineteenth century, Russia added the Caucasus region at the expense of Turkey and Persia. During the middle of the eighteenth century, a large extent of territory was acquired in central Asia. There is every probability that India would have been annexed had not Great Britain forced the Russians out of that quarter. The cession of Russian America to the United States in 1867 was about the only instance up to that date in which Russia had been known to yield territory once within its grasp.

WAR WITH JAPAN. The Russo-Japanese War of 1904-5, by which Korea and Manchuria, a recent acquisition at the expense of China, were lost, was the first positive check to territorial expansion that Russia ever experienced. Russia has litttle sea coast and most of her ports are closed by ice the greater part of the year. An all-year harbor in the East was greatly desired. This led to the acquisition of Port Arthur from China and in turn proved to be a contributory cause of the war. This war revealed an unsuspected weakness of the Russian empire. The soldiers showed no lack of bravery, but the condition of the army was found to be unsatisfactory. Peculation, theft, want of system, poor food, lack of ammunition, mismanagement, jealously, braggadocio, untruthfulness, actual want of military skill and of ordinary knowledge placed an immense assemblage of brave men before the world in the humiliating attitude of a disorganized invasion of eastern Asia. Immense sums of money spent on ships, guns, provisions and equipment were rendered useless through the incapacity of corrupt, selfish officials. Instances of military honor and efficiency were not rare, but, taken as a whole, the huge Russian war machine broke down most signally. The war is said to have cost Russia the vast sum of $1,050,000,000. To cap the misfortune of the aristocratic ruling class, the peasants rose in revolt alarmingly. The Nihilists sprang into renewed activity, and many prominent officials were assassinated. A wit defined the government as an absolute monarchy tempered by assassination.

THE DUMA. Late in 1905 the czar summoned the people to send representatives to a congress or Duma. The Duma met in May, 1906, and, somewhat to the consternation of the czar and his advisers, showed a determined spirit. The following demands were presented by the Duma:

1. General amnesty for political offences.
2. The abolition of the death penalty.

3. The suspension of martial law and exceptional arbitrary acts.
4. Full civil liberty,
5. The abolition of the council of state—circle of nobles surrounding the czar.
6. The revision of the fundamental law—practically the formation of a constitution.
7 .A ministry responsible to the Duma.
8. The right of questioning the czar and his ministers.
9. The distribution of state lands among the peasants.
10. A guarantee of the rights of trade unions.

After wrestling with the Duma for a time the ministers and the misguided czar sent it home. It seemed for a time as though nothing had been accomplished. It was feared the Duma would not be permitted to meet again, but wiser counsels prevailed and the Duma was a recognized branch of the government.

The Czar. For centuries, the theory of Russian government was Asiatic. The czar was absolute. He was, the head of the church, the father of his people, the source, under divine gift, of all power. The people had such liberty and such political authority as the czar saw fit to grant. As a matter of fact, the government was that of a small, determined aristocracy of nobles of whom the czar was despotic master; the leader, or the tool, according to the degree of native force he might possess. Reformers who have held the czar responsible for doing or leaving undone have not realized fully the degree to which the czar has been in the power of the nobility, and especially in the power and under the influence of a close circle of nobles, uncles, brothers, cousins and nephews by blood and by marriage. Theoretically, master of church and state, able, indeed, to strike a peasant dead or send a poor wretch to Siberia with none to say him nay, the czar was practically as unable to deprive the aristocracy or church of privileges as is the leader of wolves to stay the pack when the quarry is in full view. It is true that the succession to the throne was fixed by custom and imperial ukase that partook of the nature of a constitution. According to these, the sons of the czar were his heirs in order of age; next to the sons, came his daughters.

The World War and After. In 1914 the Russian Empire went into the war on the side of the allies and thereby laid the basis of the most stupendous revolution the world has known. For months the Russian forces held back the enemy, but suffering from actual battle and from cold and hunger combined with the gradual disorganization of government to break down the morale of the men. Finally began the withdrawal that startled the western world. Affairs at Petrograd and Moscow went from bad to worse, and in 1917 the czar was deposed in what is now known as the March, or Kerensky, revolution. A new government was organized with Alexander Kerensky as Minister of War and Marine, at that time the most important office. He reinspired the army, which made a brilliant drive against the Germans. But more disorganization at the rear resulted fatally for the Kerensky regime. Riots broke out in Petrograd in July. The extreme radical element was awaiting a chance to seize power; the chance came when the riots began. By swiftly disseminated and effective propaganda, the soldiers and peasants were informed that power was theirs to take. Then two men arose of whom the world in general had previously known little or nothing; they were Nikolai Lenine, a Russian of noble birth, and Leon Trotsky, a Russian Jew. In one flaming speech after another these men and their aids beat into a powerful tool the discontent of the common people. In November, 1917, the Kerensky government was driven from power and the Bolsheviki (which see) seized control. Thereafter for some months complete anarchy obtained. On March 3, 1918, the Bolsheviki signed the Brest-Litovsk Treaty with Germany, and then turned their attention to internal affairs. With enemies on every frontier and half a dozen counter revolutions within the country to contend with, Trotsky's task was to prepare a defense. This he did by creating the well known "Red Army" of more than 5,000,000 men. This force successfully stifled counter revolution and withstood the enemies without. Since 1922 this force has been reduced to about 1,500,000.

The Soviet Republic, by its declaration that private ownership of wealth is wrong and must be abolished, brought upon itself the enmity of the entire world, with the result that it was cut off from commerce and thrown upon its own resources. The peasantry of Russia was and is numerically the largest element in the country—and, because of pre-revolutionary treatment, the most ignorant. The result was that the peasants failed to give the soviets the necessary cooperation in the matter of supplying food. It became necessary to requisition grain and live stock that the city workers might carry on. Russian delegates were admitted only reluctantly into the councils of nations, and the home government has found it necessary in many instances to retreat from its position of 1917-18. Various concessions have been made to foreign capitalists, and in general the government's attitude in 1922-23 was more moderate than in the early days of the revolution.

The appended statistical table is to be considered in the light of events as described above.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	8,166,130
Population (1920)	131,546,045
Chief Cities:	
Petrograd	2,318,645
Moscow	1,050,011
Odessa	631,040
Kiev	626,313
Riga	558,000
Lodz	415,604
Kharkov	249,698
Members of Central Executive Committee	300
National revenue	$824,000,000
Indebtedness	$16,150,000,000
Farm area, acres	144,482,000
Grain, tons	20,636,000
Flax seed, bushels	2,230,000
Potatoes, bushels	284,163,000
Hay, tons	31,299,000
Flax, tons	95,000
Sugar beets, short tons	85,537
Domestic Animals:	
Horses	9,433,000
Cattle	13,500,000
Sheep	18,200,000
Swine	6,500,000
Manufacturing establishments	6,775
Operatives	1,185,542
Coal mined, tons	7,390,000
Salt, tons	350,000
Petroleum, barrels (42 gals.)	28,500,000
Suphuric acid, pounds	1,032,960
Caustic acid, pounds	101,280
Cotton yarn, pounds	33,000,000
Woolen yarn, pounds	22,400,000
Paper, pounds	90,400,000
Sugar, pounds	371,760,000
Tobacco, pounds	9,294,000
Imports	$124,250,000
Exports	$10,000,000
Miles of railway	29,909
Miles of navigable waterways	289,000
Number of schools	63,317
Pupils enrolled	4,796,284

Russian Architecture has always been modeled upon the old Byzantine form. What distinguishes it unmistakably from all other types of buildings is the conspicuous place given to its cupola.

Unlike the tall and stately churches of other lands, Russia constructs its houses of worship of square or near-square proportions, with the large cupola or lantern at the top. Usually in elaborate structures, four small cupolas crown each corner and thus add greatly to the effect.

On the whole, Russian architecture is too ponderous to be entirely artistic. An example of a church which is resplendent with eighteen century porticoes, monolithic columns, and other remnants of the time of Peter the Great, and still lacks something of the charm of the basilica, is the cathedral of St. Isaac in Petrograd.

In the northern part of Russia the churches are constructed of wood, and, as in Norway, these are usually without window openings. The masonry churches in the south are much like those of Athens and other parts of Greece, generally small and compact in plan, but none of them are so small as those of Greece. Sometimes the cupolas of the larger churches are replaced by blunt spires or pyramids of timber.

Russian Literature. See LITERATURE, RUSSIAN.

Russian Thistle, a tumbleweed, not a thistle, recently introduced into the Dakotas in seed from Russia. At first soft and harmless the bracts of the flowering stems form horny, sharp tips exceedingly painful to man or beast after they harden in autumn. In the fall these bushy herbs break off near the ground and go rolling

before the wind like American tumbleweeds, scattering their seed everywhere. In dry fields grown to small grains year after year, this Russian tumbleweed becomes a serious pest occupying the ground like clover, but a change of crops and tillage subdues it readily.

Russo-Japanese War (1904-1905), a conflict between Russia and Japan caused primarily by the Russian occupation of Manchuria. While the causes of the war are quite fully discussed in the articles on MANCHURIA and PORT ARTHUR, a brief recapitulation here may be desirable. Following the suppression of the Boxer uprising of 1900, all the nations withdrew their troops from Chinese territory except Russia, who, under pretext of protecting her railroad, maintained her armies in Manchuria. Against repeated protests from Japan she continued to bring reinforcements instead of withdrawing her troops as she had promised. Moreover, Japan feared that Russia, if established in Manchuria, would next get control in Korea, thus destroying Japan's interests in Korea as well as threatening Japan itself. In August, 1903, Japan, by the usual diplomatic channels, communicated to Russia her desire to have her voice recognized in matters touching eastern questions. No definite results followed this, and diplomatic relations between the two nations became more and more strained. In February, 1904, they were ruptured altogether, and, February 6, the Japanese government sent a fleet consisting of seven battleships, eighteen cruisers, and flotillas of torpedo boats and destroyers under Vice-Admiral Togo, to begin operations. The transports with part of the cruisers and torpedo boats were sent to Chemulpho, the port of Seoul, Korea, under Admiral Uryu, while Admiral Togo took the rest of his fleet to Port Arthur. Hostilities commenced almost immediately and the Russian fleet at Port Arthur was seriously crippled. February 15, 14,000 more troops were landed at Chemulpho, and the First Japanese Army under General Kuroki began advancing northward. By the end of March, 45,000 troops were marching toward the Yalu River. Meantime the Russians were massing their forces on the other side of the river, but the preparations on the Japanese side were characterized by attention to detail, concealing of their forces, securing knowledge of vantage points and fords, in striking contrast to the carelessness of the Russians. The battle on the Yalu began April 30 and lasted two days, resulting in a decisive victory for the Japanese. Meantime the Second Japanese Army was advancing northward on the Liao-tung peninsula; June 6, it was divided, and the new division under General Nogi, was marched toward Port Arthur to begin the siege of that stronghold. Everywhere the Russians gave way before the advancing Japanese armies till by July 9, the First, Second, and Fourth Armies were united and Field Marshal Oyama assumed command of the whole. Meantime Togo's fleet was maintaining a blockade of Port Arthur, besides harassing the Russian fleet and bombarding the fort. April 13, while the Russians were making a retaliatory sortie, the flagship of Vice-Admiral Makaroff, the Petropalovsk, struck and exploded a line of floating mines. She immediately went down, carrying with her the admiral, the famous painter Verestschagin, and 550 officers and men. Soon after, the Japanese fleet suffered several similar disasters which greatly crippled its efficiency. The ill fortune that had attended the Russians from the first continued to follow them; in August the Port Arthur fleet and the fleet from Vladivostok attempted to form a junction. Again the Port Arthur fleet encountered Togo's and was obliged to retreat, badly crippled; the result to the Vladivostok fleet was similar, and these encounters ended the naval war of 1904.

While these naval events were taking place, Russia and Japan in Manchuria were making their land forces ready for one of the most terrific battles of the war, that of Liao-Yang, which is described as "the biggest artillery battle of which history has record." Generals Oku, Nodzu, and Kuroki commanded the divisions of the Japanese Army, while General Kuropatkin was the Russian commander. The Japanese were making a direct attack on Liao-Yang and at the same time attempting to cut off Kuropatkin from communication with Mukden. September 4, the Russians were obliged to evacuate Liao-Yang, but though Kuroki's

forces attempted to cut off his retreat, they were unsuccessful.

The siege of Port Arthur had begun in May, and by the 8th, the railroad was cut and Port Arthur was blockaded both by land and sea. The events leading up to its assault and capture are the most stirring in the whole history of the war, but it is impossible to give details here. In spite of what the Russians believed to be an absolutely invincible method of defense, including rapid-fire guns, machine guns, smokeless powder, high explosives, magazine rifles and numerous other death-dealing implements, nothing could check the Japanese advance. Victories were won at Ta-ku-shan, Sia-gu-shan and Wangtai Hill. Then came the bloodiest battle of the war, that of 203 Metre Hill. It was a continuous struggle for eight days with the exception of a single hour obtained by the Japanese in which to bury their dead. "It was hardly a fight between men that was taking place on this accursed spot; it was a struggle of human flesh against iron and steel, against blazing petroleum, lyddite, pyroxylin and melinite, and the stench of rotting corpses. It was the last day but one of the long-drawn agony." December 5, the Japanese gained the top of the hill and "203 Metre Hill was lost and with it more than 5,000 Russians. It was the beginning of the end." January 1, General Stössel began negotiations for the surrender of Port Arthur, and the next day the capitulation was signed.

In March after a hard fought campaign, Mukden was occupied by the Japanese. Meantime after the destruction of the Port Arthur fleet, the Russian government had dispatched the Baltic fleet under Admiral Rojesvensky to the scene of the war. At Tangier the admiral divided his fleet, sending one division by the Suez Canal, and leading the other around the Cape. Not till the 27th of May did the reunited fleet enter Korean waters. Here it was intercepted by Togo's fleet, and the battle was immediately opened. In forty-five minutes the Baltic fleet, which had taken seven months to reach the scene of war, had been defeated and practically destroyed. This ended hostilities and August 5, 1905, largely through the good offices of President Roosevelt, representatives of Russia and Japan met at Portsmouth, New Hampshire, to arrange terms of peace. By the Treaty of Portsmouth signed September 9, Russia agreed to evacuate Manchuria, to cede Port Arthur to Japan, and to yield to Japan the Port Arthur and the Chan-Chun railroads, also the southern part of the island of Sakhalin. Japan, however, consented to waive the usual war indemnity.

Thus came to an end the greatest war of the new century, a war which revealed the internal weakness of the Russian government and gave western nations the knowledge that a new force had arisen in the East, that hereafter Japan must be included in international affairs. See MANCHURIA; PORT ARTHUR.

Russo-Turkish War, a conflict between Russia and Turkey, 1877-8. Turkey's barbarous treatment of her Christian subjects in the Balkan States had long been a cause of protest on the part of the western nations. In 1876, particularly brutal massacres took place in Bulgaria which have since been known as the Bulgarian Atrocities. As a result of these the pan-slavic element of the Balkans appealed to Russia for assistance, and she declared war against Turkey in 1877. At first the Russians met with defeat in the battles of Plevna, but after receiving re-inforcements from Roumania the Turks were defeated in a series of encounters. The Porte sued for peace and the Treaty of San Stefano was drawn up by which Bulgaria was to receive increase of territory and to be given autonomy though still tributary to Turkey. Reforms were to be introduced into the other parts of European Turkey. Russia was to receive territory in Asia and Dobrudza in Europe. Unfortunately the western European powers, suspicious of the Russian advance, interfered and forced the acceptance of a new treaty, that of Berlin, whereby Bulgaria lost part of the territory granted by San Stefano. See BERLIN, TREATY OF.

Rust, in metallurgy, a rough spot on the surface of a metal. Iron rust is typical. It is a reddish or orange-yellow stain due to a combination of the metal and oxygen derived from moist air. Rusting has been called a slow combustion or burning. In

botany rust is a decayed spot due to the growth of a small plant—a parasitic fungus —that eats away the plant on which it lives. Rusted oats, for example, are oats whose stalks have been badly eaten by microscopic plants whose colonies have lodged in spots on the leaves and stems of the oats. Rusts spread by means of dust-like spores and are of many kinds, one or more for each of a large number of fruits and field crops and vegetables. They usually grow unnoticed until they are ready to cast off spores when they break out in brown blotches or spots. Crowded plants and moist weather are likely to develop rusty grain. See FUNGUS.

Rustum, in Persian legend, a famous warrior. He was of gigantic size and of great piety and valor. He met with many adventures in defending the Persian throne during his life of several centuries. His story is told in the epic poem, *Shah Nahmeh.* The most dramatic episode of his career is connected with his son Sohrab. Rustum married a beautiful princess Tahmineh. Obliged to leave her soon after their marriage, Rustum gave his wife an amulet, and said that if a son should be born to them, she must bind the amulet upon his arm. A boy was born, but fearing that the child would be taken from her, Tahmineh sent word to Rustum that the child was a girl. Sohrab grew into a prodigy of strength and courage. When only ten years old he started out to seek his father. Unwittingly, father and son met and engaged in single combat and the son was slain. Rustum discovered his identity by means of the amulet. Matthew Arnold has made use of the story in a poem entitled *Sohrab and Rustum.*

Rutabaga. See TURNIP.

Ruth, a book of the Old Testament. The name is Hebrew, meaning a friend. The authorship and date of its composition are unknown, but it belongs evidently to the period in which Hebrew literature was at its best. In modern literature it would be considered a charming romance. The central figure is Ruth, a Moabitess, who becomes attached to her mother-in-law, Naomi, in the land of Moab. On the death of her husband and Naomi's decision to return to Palestine, Ruth declares that she will return with her. "And Ruth said, Entreat me not to leave thee, or to return from following after thee: for whither thou goest, I will go; and where thou lodgest, I will lodge: thy people shall be my people, and thy God my God. Where thou diest, will I die, and there will I be buried; the Lord do so to me, and more also, if aught but death part thee and me." Here she attracted the attention of her husband's kinsman, Boaz, who later took her to wife. Ruth was the great grandmother of David, and thus the ancestor of Mary, the mother of Jesus. See BIBLE.

Rutland Vt., the county seat of Rutland County, is known as the "Marble City," because it is the center of the greatest marble industry in the United States. It is situated on Otter Creek, and on three railroads, about 56 miles south-southwest of Montpelier, the state capital. It is in a valley noted for its production of maple syrup and sugar, and honey, and is in view of some of the loftiest peaks of the Green Mountains. In Rutland is made the majority of the marble working machinery used in the United States, and its quarries are among the most productive in the world. Other manufactures are maple sugar utensils, scales, boilers, engines, silos, bricks and furniture.

One of the finest buildings in the city is the Memorial Hall, built of marble donated by the quarrying companies. The city has modern public schools and two fine libraries. The population was 14,954 in 1920.

Ruysdael, rois'däl, **Jacob van** (1625-1682), a Dutch painter. He was born in Haarlem and died in the same place. He lived in Amsterdam during the productive years of his life and traveled through Holland, Switzerland, and Germany. His paintings are almost entirely landscape studies, and his best works are those which picture a gloomy forest-glade, a ruined castle with picturesque background, or a bubbling waterfall. A spirit of melancholy broods over his poetic scenes, but the depth of feeling they convey has made Ruysdael one of the greatest of Dutch landscape painters. His fame, however, was posthumous, and he died in an almshouse. *The Storm at Sea, The Waterfall, The Hunt, Ford in a*

PLANT DISEASES

1. Cluster-Cup of Wheat Rust on Barberry
2. Rust on Leaf and Stem
3. Rye Head with Ergot
4. Blighted Potato Leaf
5. Powdery Mildew on Grape Leaf
6, 7, 8. Loose Smuts of Oats, Wheat, and Barley

Wood, and *The Windmill* rank among his most highly appreciated paintings.

Rye, an important cereal. It was originally a wild grass. It is thought to have been cultivated first in the region between the Black Sea and the Caspian. There are several large bottle-brush grasses in America that are properly known as wild rye. The cultivation of rye has some advantages over that of oats, wheat, and barley. It is little subject to attack by the chinch bug. It is less readily killed by continued frost. It grows fairly well on light or exhausted land without requiring a rotation or change of crops, being in the latter respect more like timothy or wild meadow grass. Little chaff is released in threshing. Rye is raised chiefly in northern Europe. Its flour makes the black rye bread of Germany, Russia, and the Scandinavian countries. Mixed with wheaten flour it is gaining favor in America. Rye is the foundation of Kvas, the Russian national drink, of Holland gin, and of rye whisky. The following are production statistics for the year 1921, for the United States:

State	Bushels
Massachusetts	30,000
Connecticut	95,000
New York	806,000
New Jersey	998,000
Pennsylvania	3,008,000
Delaware	44,000
Maryland	238,000
Virginia	418,000
West Virginia	120,000
North Carolina	273,000
South Carolina	50,000
Georgia	108,000
Ohio	1,079,000
Indiana	3,978,000
Illinois	3,349.000
Michigan	8,346,000
Wisconsin	4,756,000
Minnesota	10,185,000
Iowa	515,000
Missouri	280,000
North Dakota	9,306,000
South Dakota	3,056,000
Kansas	1,138,000
Nebraska	1,714.000
Kentucky	180,000
Tennessee	152,000
Alabama	12,000
Texas	156,000
Oklahoma	408,000
Arkansas	9,000
Montana	590,000
Wyoming	315,000
Colorado	1,058,000
Utah	140,000
Idaho	160,000
Washington	294,000
Oregon	554,000
U. S.	57,918,000

World production statistics are given in the following table:

Country	Bushels
United States	57,918,000
Canada	21,455,000
Chile	55,000
Austria	12,661,000
Belgium	17,761,000
Bulgaria	8,390,000
Czecho-Slovakia	54,382,000
Denmark	12,204,000
Finland	10,385,000
France	44,494,000
Germany	260,144,000
Greece	3,151,000
Hungary	22,095,000
Italy	5,634,000
Netherlands	16,646,000
Norway	1,115,000
Rumania	8,858,000
Poland	167,215,000
Spain	28,118,000
Sweden	28,502,000
Switzerland	1,559,000

Rye-House Plot, in English history, an attempt to assassinate Charles II and his brother the Duke of York. The ill-contrived plan was arranged by a lot of low fellows. It was to be put into effect at a farm known as the Rye-House, belonging to one of their number, as the king and his brother were returning from the Newmarket races. The plot was frustrated by the return of the royal party earlier than was anticipated. Some inkling of the conspiracy leaked out and numerous executions followed. The noblemen, Lord William Russell, Lord Essex, and Algernon Sidney, who were in all probability totally ignorant of the plot, became involved in the general charges which followed and two were executed, while Essex put an end to his own life.

S

Sabbath, the Hebrew day of rest. The division of the month or moon into four weeks of seven days each may be traced to the plains of Mesopotamia, from which the Hebrews journeyed westward, but the date and place of the institution of the seventh day of the week as a day sacred to Jehovah is unknown. The "Remember the Sabbath day to keep it holy" of the Ten Commandments seems to imply that it was already a sacred day among the descendants of Abraham.

The proper observance of the Sabbath was a point of much controversy among the Jews, and varied at different periods of the national history. Instances are related of an enemy taking advantage of the reluctance of the Hebrews to perform military service on the Sabbath. Even massacres are said to have been perpetrated and to have forced the Hebrews to concede the necessity of defensive warfare on all days of the week. In captivity the Hebrews found it difficult to observe the day among so many peoples of adverse notions. In the reign of Nehemiah the gates of Jerusalem were closed at sunset on what we are accustomed to call Friday evening to prevent the entrance of the merchants of Tyre with their camel loads of merchandise, "who brought all manner of ware and sold on the Sabbath unto the children of Judah." Customarily the Judean Sabbath began at sunset; hence earlier in the valleys than on the hill tops, and lasted through the following day and evening until three stars were visible.

The Hebrew Sabbath fell on our Saturday. The Jewish church still observes the seventh day as a day of rest and worship, as do likewise the Seventh-day Adventists and some other denominations. The exact time and circumstances under which the first day of the week was adopted as a day of worship are not known, but it is thought that the early Christians, first of all, and very naturally, ignored the Jewish Sabbath, and that meetings were held so frequently on the first day of the week, being the traditional day of the Lord's resurrection, that custom grew into law. Later, with the revival of Bible reading, the Jewish regulations relative to the observance of the seventh day, as well as the name of Sabbath, were transferred by the Christians to the first day, or Sunday.

In Puritan England and in New England the Sabbath began at sunset Saturday. In mid afternoon there was hurrying around to provide fuel and do chores to make ready ere the sunset. All day Sunday a solemn stillness settled over the land — the very traveler on the road must show reason why he should not be reproved for violating the Sabbath. Sunday afternoon children stood with their faces flattened against the window panes watching the slowly descending sun. The moment it sank behind the hill they issued out with shouts of joy for evening sport. The name Sunday, by which the first day is known, is a Saxon word meaning the day of the sun. Being a heathen name, the Quakers and Puritans prefer First Day. For a similar reason, no doubt, the Scotch Presbyterians cling to the name Sabbath day.

The proper observance of the Sabbath is still a large question. As to the need of resting from work there is no doubt. Both man and beast can accomplish more work by resting. One day in seven seems in accord with experience. Travel presents the most complex question. It has never been customary for seagoing ships to furl their sails on Sunday. Ocean steamers continue their voyages as a matter of course. In addition to the question of the extent to which pleasure boats, trolley lines, and excursion trains should run on Sunday, there is the question of through traffic. Railroads very generally meet the question by continuing suburban service on Sunday. What are known as local trains, both passenger and freight, are laid off on Sunday. Through passenger trains run seven days in the week. The same rule holds with reference to through freights carrying perishable goods.

Saber, a heavy one-edged sword with a thickened back. It usually curves and tapers slightly at the point, but it may be per-

SABINE WOMEN URGING PEACE BETWEEN THEIR ROMAN HUSBANDS AND THEIR SABINE RELATIVES

From the Painting by J. David

fectly straight. It is probably an evolution or modification of the Arabian scimitar. The saber is a regular part of the cavalryman's equipment. When not in the hand ready for use it is carried in a scabbard. See SWORD.

> Flashed all the sabers bare,
> Flashed as they turned in air,
> Sab'ring the gunners there.
> —Tennyson, *Charge of the Light Brigade.*

Sabines, sā'bīnz, an ancient people of Italy. They occupied a region, for the most part rugged and mountainous, eastward from the central portion of the River Tiber. They preserved a reputation for simplicity and austerity of manners even in the day of Livy and Cicero. They have been called the Spartans of Italy. According to tradition the young men of Rome on one occasion secured wives by inviting the Sabines and their families to a feast and celebration of games. At an agreed signal each Roman seized the Sabine virgin who pleased his fancy and carried her away by force. When later the Sabines attacked the Romans to avenge the affront, the young wives besought their parents to make peace. The incident is known as the carrying away or rape of the Sabines.

Sable, a dark fur-bearing animal of the weasel family. It is about eighteen inches in length, with a fine bushy tail two-thirds as long. It is related closely to the American marten, and, like it, has fur of three lengths. It is one of the most important fur-bearing animals of Russia and Siberia. Large numbers are trapped in the winter season, the pelts are taken off whole, turned inside out, stretched on a frame and dried, then sold to local buyers and sent to the Leipsic fur market. The fur is considered more valuable than that of the marten or American sable. The fur has the peculiar quality of smoothing in any direction. Fine dark pelts are worth from $10 to $150 in Leipsic or London. It is the most expensive of all fur. The nobility of Russia regard the fur of the sable as more desirable than that of the seal. The sable overcoat of the czar is valued at $22,000. The darker the fur, the more valuable it is considered. The corporation robes of the London aldermen are lined with sable. The color of the fur of the sable being generally dark, the word has been used to mean black, as in such expressions as, "Night, sable goddess," "Sable trappings of woe," "Sable hue," etc. See FUR.

Sabot, sa-bō', the French name of a shoe made from a single piece of wood. It is much worn by the peasantry of France and Belgium. It does not differ essentially from the wooden shoe of Scandinavia. When worn with woolen hose, the sabot is far from uncomfortable. It is considered especially desirable in damp or muddy weather. The sabot is frequently softened to the foot by stuffing it with straw.

Sabotage, a term derived from the French "sabot" (wooden shoe) originally used as a slang expression for clumsiness or carelessness on the part of workmen; but since 1897 it has been employed to describe a principle or method of labor warfare. The term has been variously defined as being equivalent to "bad work for bad wages," to the old Scotch "ga canny," that is "go slow," and to "soldering on the job." As now generally understood, it means the substitution of secretly inefficient, unprofitable, or even destructive work for the open strike by employes who are dissatisfied with their wages or conditions of labor. In the more extreme cases it means secret violence, such as tampering with machinery or spoiling the products of labor. Thus in the railway shopmen's strike of 1922, which was general throughout the United States, it was charged that many acts of sabotage were committed by or on behalf of the strikers in various railroad centers, these acts including the cutting of airhose between the cars of freight trains, tampering with the water supply, willful damage to locomotives to render them temporarily useless, and other acts whereby the property of the railroad companies was damaged so as to interfere with the operation of trains.

"Sabotage is a principle of action capable of an almost infinite variety of applications," says John Spargo, a leading exponnet of Socialism. "It may involve violence or it may be peaceful. It may involve destruction of property or it may not. It may consist of telling lies or of telling the simple truth. It is, therefore, exceedingly difficult to formulate a satis-

factory definition of it clearly, though we may understand its meaning. It is essentially a furtive and stealthy policy, practised by individual workers, having for its aim the obstruction of industry and business to such an extent that employers will suffer a loss of profits so great as to compel them to grant the workers' demands."

An Italian defender and advocate of sabotage, which is a thoroughly un-American policy and practice, gives two definitions of it, as follows:

1. "Any conscious and willful act on the part of one or more workers intended to slacken and reduce the output of production in the industrial field, or to restrict trade and reduce profits in the commercial field, in order to secure from their employers better conditions, or to enforce those promised, or maintain those already prevailing, when no other way of redress is open.

2. "Any skillful operation on the machinery of production intended not to destroy it or permanently render it ineffective, but only temporarily to disable it and put it out of running condition, in order to make impossible the work of 'scabs' or strikebreakers, and thus secure the complete and real stoppage of work during a strike."

Sabotage is one of the forms in which workers whether on strike or while still remaining in their employment, influenced by European methods and teachings, endeavor to secure their ends. It is a principle of the so-called "direct action," which may be defined as any action taken by the workers in case of industrial disputes, without the intervention of the state or the due process of law. Besides sabotage, direct action includes general or local strikes, boycotts, assaults on the person, destruction of property, and violence. It is defined by its advocates as any method which drives the employer, either by interest or fear, to yield to labor's demands.

Saccharin, săk′kà-rĭn, a crystalline compound prepared from coal tar. It was discovered by Dr. Fahlberg, of Salbke, Germany, in 1887. It is five hundred times stronger than cane sugar, and one grain of saccharin will sweeten to taste 70,000 grains of distilled water. It is used extensively in Germany in the manufacture of cordials, beverages, and confectionery, as well as for preserves, jellies, and baking. It can be used by diabetic patients because of its non-fermentable qualities, but as a food it does not nearly equal cane-sugar in value.

Sachs, säks, **Hans** (1494-1576), a German poet of Nuremberg. His father was a tailor. He himself was bred to the craft of shoemaking in his youth. He traveled from one German city to another, attending the literary and musical meetings of the Meistersingers. As a lad he received some little education, including lessons in Latin grammar. In early manhood he settled down to the shoemaker's bench. He was a leading spirit in the local association of Meistersingers. By composing continually at his bench he pounded out an immense amount of poetry. While not of high literary order it abounds in humor and good practical sense, somewhat after the style of Benjamin Franklin. One catalog of his productions includes 4,275 songs, 208 comedies and tragedies, 1,700 tales, dialogues, proverbs, and fables, and 73 hymns. Five large folio volumes were required to contain his writings. He appears to have been a prosperous, contented man. He was twice married and had five sons and two daughters. His grave may be seen in the quaint old churchyard of St. John's in Nuremberg. Whittier had no little admiration for the old German shoemaker.

> Thy songs, Hans Sachs, are living yet,
> In strong and hearty German.
>
> —*The Shoemakers.*

Sack, the name of a certain light colored wine. The word is from the French *sec,* meaning dry. Sack, accordingly, is a dry wine, that is to say, a strong alcoholic wine free from sweetness or fruity flavor. The term was applied originally to strong white wine brought to England from Spain and the Canary Islands. It was used by way of distinction from the wines of the Rhine and the red wines of France. Shakespeare's plays are full of reference to a cup of sack, etc. It was the favorite beverage of Falstaff. See WINE; ALCOHOL.

Sackville, Thomas (1536-1608), an English statesman and poet, and the author

of the first regular English tragedy. He was a native of Sussex. He studied at both Oxford and Cambridge. *Gorborduc,* or *Ferrex and Porrex,* was the name of his first tragedy. The plot is laid in the legendary days of Britain. King Gorborduc divides his kingdom between Ferrex and Porrex, his two sons. The sons quarrel and Porrex kills Ferrex. The mother slays Porrex in revenge. The people rise in indignation and put the mother and father to death. Then the nobility collect an army to put down the rebels and all fall to destroying one another. It was written in blank verse, but is unimaginative and the dialogue is stilted and unnatural.

Sacrament, in theology, a rite instituted by Christ to confer grace. In the Roman Catholic and the Greek chucrhes, there are seven sacraments; baptism, confirmation, the eucharist, penance, extreme unction, holy orders, and matrimony. In Proestant churches there are two sacraments, baptism and the Lord's supper. The Friends or Quakers reject all sacraments.

Sacramento, Cal., the capital and fifth city of the state and the county seat of Sacramento County, is on the Sacramento River and on the Western Pacific and Southern Pacific railroads, 90 miles northeast of San Francisco. The environs of the city are highly attractive, and the river valley is one of the most productive agricultural regions in the state.

The most conspicuous building is the state capital, which occupies a commanding position in the center of a thirty-four-acre park. Other features of Sacramento are McKinley, South Side, City Plaza and Recreation parks, the state fair ground, Fruit Exchange, Masonic Temple, court house, post office, Roman Catholic cathedral, Federal building and a number of Prostestant churches.

The noteworthy educational and other institutions are the graded public and parochial and high schools, Christian Brothers' College, Heald's Business College St. Joseph's Academy, and Howe's Academy, and state, public and Odd Fellows' libraries; city, county and Southern Pacific Railroad hospitals, Marguerite Home and the Protestant Orphan Asylum.

Fruit packing and canning establishments, preparing for the market the valuable product of Sacramento Valley orchards, are among the most important manufactories. Other plants produce furniture, harness and saddles, soap, sewer and water pipe, mattresses, pumps, dressed meats, flour and grist, and foundry and machine shop products.

The first settlement was made here in 1839 by Captain John A. Sutter on land held under grant from the government of Mexico. He built a fort and fur trading post, naming it New Helvetia. The fort has been restored and is still to be seen. In 1848 the village of Sacramento was planned, and was chosen as the state capital in 1854. A city charter was secured in 1863. The inhabitants of Sacramento numbered 65,908 in 1920. See CALIFORNIA; SAN FRANCISCO.

Sadducees, sād′ū-sēz, a religious and political party among the Hebrews. Our knowledge of them is derived chiefly from the New Testament and the writings of Josephus. Little is known of their origin, rise, or disappearance. They appear to have been bitterly opposed to the Pharisees, whom they regarded as fanatical and over zealous. The Sadducees denied the doctrine of the resurrection. They disputed the existence of angels and spirits.

Sadowa, sä-dō′vä, a village in Bohemia near the cathedral city of Königgrätz. It lies on the Elbe, about sixty-two miles east of Prague. The village is noted as the scene of the decisive battle of the Seven Weeks' War, fought July 3, 1866. The Prussians, numbering 220,000, under the command of William I and the Crown Prince, defeated 205,000 Austrians under the command of Benedek. The Austrians lost 40,000 men; the Prussians, 10,000. As the result of this battle Austria retired from the confederation of German states, and left Prussia free, as the event proved, to form the German Empire. See PRUSSIA.

Safe, a receptacle, usually of iron or steel, for the safe keeping of money, jewelry, and other valuables. The safe is the lineal descendant of the old-time strong box or oaken chest. As late as 1700 even royalty had no better means of keeping valuable documents and precious wares than in wooden chests, strengthened with rawhide, or

with bands of metal. The next stage was the building of very heavy chests so completely covered with metal that they would stand heat in a fire for two or three hours.

The modern safe is of two kinds, the steel vault which is built into the masonry of buildings at the time of their construction, and the movable steel safe. The latter is built of double steel walls several inches apart. The space between the inner and outer plate is filled with some non-combustible, non-conducting material, as plaster of paris, asbestos, fire clay, alum, mica, or chalk.

The lock has received particular attention. Several burglar-proof locks have been invented, but each in turn has been abandoned for a lock of greater security. The more expert burglars become, the more ingenuity is shown by safe builders. There are probably a few locksmiths able to open any safe constructed, but, generally speaking, a modern safe defies the utmost skill of the burglar. The time lock is opened by clockwork at a given hour. Even the owner cannot open it at any other time. The usual method employed in "cracking" a safe is that of pouring nitroglycerine into the crevices around the door and exploding it by means of a fuse. In the case of expensive, massive safes, the door fits so closely that it is impossible to introduce an explosive. In that case, the burglar aims to drill a hole and insert a stick of dynamite. Train robbers resort usually to this method in getting at the contents of an express messenger's safe. A burglar-proof safe costs all the way from $20 to as many thousands, according to size, material, and workmanship. The vault of the Carnegie Safe Deposit Company, of New York, cost half a million dollars. It is protected by plates of steel armor, proof against the heaviest guns of the American navy. It is designed for the safe keeping of bonds, stocks, mortgages, wills, and other valuable documents. It has been nicknamed the pocket-book of Wall Street.

The safe of the National City Bank, also on Wall Street, is another expensive vault. Four hundred tons of steel and seventy-five tons of fireproofing cement were employed in its construction. The doors are eight feet thick. The very hinges weigh two tons apiece. Should a burglar attempt to enter out of hours he would be scalded to death by jets of boiling hot steam admitted through a series of brass tubes connected with a steam boiler. It is hardly worth while to close the doors of the vault, for all around the whole structure are the brass nozzles, which, by the touch of a button anywhere in the building, and in several places outside of it, would render the vicinity of the vault a cauldron of death. The total cost of this remarkable defense against thieves was $250,000.

The safe industry of the United States is in the hands principally of ten leading corporations. They have a capital of about $6,000,000, employ 5,000 or 6,000 workmen, and turn out about $12,000,000 worth of vaults and safes a year.

See Lock.

Safety Lamp, a miner's lamp. As is well known, the passages in mines, especially coal mines, fill not infrequently with an explosive gas called fire damp. It is a compound of hydrogen and carbon, mixed with atmospheric air. In the earlier days of coal mining, fire-damp explosions were so frequent and so disastrous to human life that Sir Humphry Davy, an English chemist, gave the subject serious attention and invented his so-called safety lamp. The flame of the lamp is surrounded by a wire gauze having about 625 meshes to the square inch. This lamp may be lighted and carried into the dangerous fire damp without an explosion. The gases pass through the meshes of the gauze and burn with a feeble blue flame within, but not in such a way as to obstruct the light of the lamp. The flame of the lamp and of the burning gas within cannot pass out through the meshes of the gauze without being cooled to such an extent that there is no danger of igniting the gas in the mine. The safety lamp is constructed in such a way that it may be attached to the miner's hat band and worn on the forehead as he goes about his work. See Damps; Davy, Sir Humphry.

Safety Valve, a device calculated to prevent steam boilers from exploding. It consists essentially of an opening or short tube connected with the boiler and closed with a movable but tightly fitting valve. In the case of stationary low-pressure en-

gines this valve is held in place by a weight that may be blown off and permit the escape of steam before the internal pressure reaches the danger point. For high-pressure boilers, the valve is held down usually by a lever which passes over the valve and is weighted at its free end according to the pressure which the boiler is designed to carry. In the case of a locomotive which bumps and jerks along over a rough track, it is evident that neither the dead weight nor lever valve would be suitable. For this purpose the pot valve has been invented. The lid is held in place by a spiral spring which permits the escape of steam when the pressure becomes too great, but returns the lid to its place as soon as the pressure has diminished. In exaggerated accounts of steamboat races the captain is facetiously described as sitting on the safety valve. Laughter is sometimes called the safety valve of the human heart. See STEAM ENGINE.

Saffron, a bulbous plant of the crocus family. It has long grass-like leaves, and flowers that spring from short scapes like those of the crocus. The flower is purple; the style divides into three orange-colored stigmas an inch or so in length. These stigmas hold the yellow dye known commercially as saffron. They are picked in the early morning and dried in a kiln. The stigmas of over 1,000 flowers are required to yield an ounce of the dye. The saffron is a native of the Levant. It was cultivated by the Arabs in Spain during the tenth century; and during the fifteenth century was raised in quantities in England for the use of dyers. The ancient Greeks considered saffron a royal color. In addition to its use as a dye, saffron is also employed in medicine. The English and Cornish cooks use saffron to flavor a certain sort of bread. A "saffron" complexion denotes a yellow, sallow hue. Saffron is produced for sale in Spain, Asia Minor, Persia, Cashmere, and China. See DYE STUFFS.

Saga, in Scandinavian literature, a legend or tradition. The Saga in Scandinavian mythology is the name of the goddess of history and narrative. It was the duty of the skalds and sagamen to preserve the accounts of warriors and their deeds and recite them when called for. The skald recited or sang in poetry, but the stories of the sagamen were in prose. These legends came gradually to be composed in regular form and according to fixed laws. A saga gave the history of some hero and resembled the epic in every respect excepting the one of versification. The sagas preserved specially in Icelandic literature are of great historical value. The oldest sagas extant are believed to have been written down first during the twelfth century, probably after they had been recited orally for a generation or two. The sagas fill over 200 volumes and include mythical and romantic, as well as heroic, stories, for the word saga seems to denote both tradition and history. They are in reality prose epics. See LITERATURE; ICELANDIC; EDDA; SKALD.

Sage, a member of the mint family. Sage is a perennial herb with square stems, opposite aromatic woolly leaves, and two-lipped flowers. There are 650 allied species. Several species are cultivated for ornament. Old-fashioned sage is raised for seasoning and medicine. Sage leaves rank with catnip, pennyroyal, and boneset in the list of household remedies. Market gardeners raise enormous quantities, cutting each plant twice a year. Sage is used chiefly for seasoning sausage, cheese, soups, stews, and dressing. The flavor is due to a volatile oil. See MINT; CATNIP.

Sage, Russell (1816-1906), a noted American financier, who though in his youth an errand boy and grocery clerk, left to his wife a fortune of $50,000,000. He was born at Shenandoah, N. Y., and received there a public school education. In 1837 he acquired an interest in a retail grocery business in Troy, N. Y., and was later interested in a similar wholesale firm. After holding minor political offices, Mr. Sage was elected to Congress in 1853, where he served on the Ways and Means Committee. In 1874 he bought a seat on the Stock Exchange; he became associated with Jay Gould, and soon became known as the greatest railroad manipulator of his day. Mr. Sage had few friends and many enemies. He was known as a cold, self-centered man, whose one joy was the acquirement of wealth. To his wife he left his entire fortune, to do with as she saw fit.

Sage Cock, Sage Grouse, or **Cock of the Plains,** the largest species of the grouse family. The full-grown male is about two and one-half feet in length, the female nearly two feet. The inflated sacs of yellow skin found on either side of the neck resemble those of the prairie chicken, and by means of these air sacs the cock produces its spring call or cry, a hollow, booming sound. The bird is brown in color, with a mixture of black and gray on the wings, and black underneath. The nest is built on the ground, and is made of dried grass and twigs. The cock is found on the sage plains of the Rocky Mountain region, and though it lives in part on insects and berries, its usual food, the wild sage, is eaten so freely that the flesh is not in great demand for food because of its unpleasant bitter flavor.

Sagebrush, low, bitter, shrubby plants of the composite family. Botanically, they are known as artemesia. They are closely allied to wormwood, southernwood, and the common mugworts of old fields. Extensive tracts in the great plains of the West are covered with this monotonous, homely shrub, through which the traveler sees an occasional coyote slinking away. The common sagebrush is a gray, shabby bush, reaching an extreme height of twelve feet. Occasionally a gnarly old stem attains a diameter of several inches.

Saginaw, a city in Michigan on the Saginaw River, sixteen miles from Saginaw Bay. Formerly noted as a great lumbering center, it has now become known chiefly for its manufacturing. This includes beet sugar, salt, plate glass, furniture, wooden ware, tobacco, malt liquors, bricks, carriages and wagons, harness, gasoline engines, automobiles, machine shop and foundry products and many other articles. There are also extensive railroad shops, and in the vicinity are found mines of bituminous coal. Population, 1920, was 61,903.

Sagittarius, săj-ĭ-tā′rĭ-ŭs, in astronomy, the ninth sign of the zodiac, into which the sun enters November 22d. The constellation comprises eight visible stars. In ancient mythology, the story runs that the centaur, Chiron, was changed into this constellation and named Sagittarius, which means the archer. On charts and celestial globes, the constellation is represented by a centaur just shooting an arrow from his bow. See CENTAUR; CHIRON; ZODIAC.

Sago, a starchy product of several palm trees of Malaysia. When the sago palm is about to blossom the pith is full of starch. The trees are cut into logs of convenient lengths. These are split and the pith is scraped out of their centers. From this pith, by repeated tramping and washing in a trough of water, a quantity of white liquid is obtained. This heavily laden white water is strained off into a receptacle and allowed to "settle." A white starch is deposited. This, when dried, is the sago flour of commerce. The natives make bread of it. Singapore exports $8,000,000 worth of sago and tapioca yearly. See TAPIOCA.

Saguenay, săg-e-nā′, a river of the province of Quebec. It enters the St. Lawrence through a deep cañon at the Bay of Tadousac, 125 miles below Quebec. It drains Lake St. John. The greater part of its course lies between precipitous, rocky walls. As far as Ha-Ha Bay, at the foot of Chicoutimi Falls, the head of navigation, the channel has a remarkable depth of from 100 to 3,000 feet. The scenery is romantic and impressive. There is excellent salmon fishing. During the summer season, the Saguenay is visited by thousands of tourists. Steamers are taken usually at Montreal or Quebec. See LABRADOR.

Sahara, sa-hä′ra, the great desert region of North Africa. It extends from the Atlantic Ocean to the Nile, and from the provinces of the Mediterranean to the drainage basin of the Niger. It includes an area of about 3,500,000 square miles, — a region equal in extent to Europe. Although there are level stretches, the region as a whole is far from being a level, sandy plain. South of Algeria, it dips to a depth of 100 feet below the level of the sea. Elsewhere it rises to heights of 2,000, 4,000, and even 8,000 feet. In fact, half way from the Atlantic to the Nile, there are spots so elevated that the mountains are crowned with snow three months in the year. Indeed, the Sahara, taken as a whole, is a rather rough, stony, mountainous region, traversed by valleys and defiles, yet expanding in places into broad plains or extensive sand dunes. Generally speaking, it is a

region of desolation. It is almost a rainless region. The prevailing winds are hot and dry, having been robbed of their moisture. Were there an abundance of rain, the country would be fertile. As it is, wherever streams are present, or springs, having their sources in distant mountains, break forth, fertile valleys and oases are found.

The date-palm is the characteristic plant of the oasis. Olives, apples, peaches, oranges, grapes, wheat, barley, rice, and a great variety of temperate and tropical plants flourish. The population of the oases is chiefly Arab, Moor, negro, and Jew, in all three or four million people. The chief domestic animal is the camel. There are herds of black cattle, tame ostriches, and of goats. There is a considerable caravan trade in ivory, ostrich feathers, gums, spices, gold dust, indigo, palm oil, dates, cotton, salt, alum, musk, hides, weapons, gunpowder, cotton and silk goods. The list of wild animals includes the jackal, hyena, baboon, fox, jerboa, and mountain sheep. There are nearly one hundred different species of birds, including the ostrich and the buzzard. Among reptiles are the horned viper, small pythons, and numerous lizards, chameleons, and tortoises.

As might be expected, civilization is at a low ebb. The fierce looking Arab chieftains who appear at Mediterranean cities, or in Egypt, at the head of long caravans of camels, laden with the productions of the desert, are, at home, robbers and plunderers of their weaker neighbors. They are still ready to carry on a slave trade with any who are willing to buy. The regular routes may be traced by a continuous string of the bones of camels that have fallen by the wayside during literally thousands of years of caravan traffic. It is quite possible that at some future time the sunken portion of the Sahara may be redeemed by a system of irrigation canals and converted into one of the fertile regions of the world. A railroad backed by French money is making its way southward from Algeria across the Sahara to Timbuctoo on the Niger River

See CARAVAN; TIMBUCTOO; DESERT; DUNE; OASIS.

Sail, sāl, an expanse of canvas used to catch the wind in order to propel a ship. In a measure, any cloth will answer the purpose. The Egyptians used a single large sail made of linen or papyrus. The body of a person or even a paddle held up serves to catch the wind. An open umbrella is of assistance in case a rowboat is desired to go with the wind. The natives use various materials in different parts of the world. Bamboo matting is in use extensively in the East Indies.

The best sail cloth, however, is made of flax. It possesses flexibility, lightness, and strength to a remarkable degree. Sail cloth is made usually in bolts twenty-four inches wide and forty yards in length. Such bolts vary in weight from twenty-five pounds for No. 8 to forty-six pounds for No. 1, according to the strength to be expected. In making large purchases, it is customary to test the quality of the cloth by subjecting narrow strips to a breaking weight.

The making of sails is a trade in itself. The sailmaker uses needles of various sizes. If the sail has been laid out and the strips cut off at the proper length and angle, he proceeds to sew them together in double flat seams. The selvages are lapped from an inch to an inch and one half, according to weight. The needle is pushed through the cloth, not with a thimble, but with a palm protector. About 120 stitches are taken to the yard. The edges of the sail are strengthened by sewing in a cord or rope. In the navy, this rope may be from an inch to six inches in diameter, according to the size of the sail. Loops are formed in this rope at short intervals to serve as eyelets for the cordage of the ship.

The top margin of a sail is called its head; the lower margin the foot. The eyes at the lower corner are called clews. The ropes that run from the clews to stretch the sail are called shrouds. A full-rigged, three-masted sailing ship has between thirty and forty sails. Each has its name. The lowest sail on a mast is the course; the next is the top-sail; above that comes the top-gallant-sail; then the royal; lastly, if used, the sky-sail, or "sky-scraper." Each of the sails named may be widened by a pair of narrower supplementary sails called studding sails.

The name of each sail has prefixed to it the name of the mast on which it is set.

Thus we have the fore-topsail, the main-topsail, and the mizzen-topsail. The jibs are sails attached to the bowsprit projecting from the prow of the ship. A timber used for spreading the foot of a sail is called a boom; one used for extending the head of the sail, a gaff. A cross timber on a mast is known as a yard. The term spar is used to include any round timber in the rigging, whether mast, yard, gaff, or boom. The single sail of a small boat is called usually a lug sail. The sails set on the masts of a ship are known as square sails. The spanker, the staysails, and the jibs are more or less triangular in shape. They are known as fore-and-aft sails. Each sail is provided with short pieces of rope with which to tie it up when rolled. The number of sails which are set is, of course, determined by the wind.

Sailors distinguish winds as light airs, winds, and breezes; moderate breezes, fresh breezes, and strong breezes; moderate gales, fresh gales, strong gales, heavy gales, and storms. It is considered necessary to keep some canvas flying even in a storm in order to handle the ship.

See SHIP.

Saint Andrew. See ANDREW, SAINT.

St. Andrews, an ancient city of Fifeshire, Scotland. It was named for St. Andrew, the patron saint of Scotland. It is situated on the North Sea, about three-fourths of the way from Edinburgh to Dundee. It was made a royal burgh by David I in 1140. It became the seat of a bishop in the ninth century, and of an archbishop in 1472. It was for centuries the ecclesiastical capital of the kingdom. The old cathedral and castle are both in ruins. St. Andrews played no little part in the early days of the Scotch reformation. Cardinal Beaton was assassinated here and George Wishart was burned at the stake at the door of the castle. The University of St. Andrews, the earliest in Scotland, was founded in 1411. It has a library of 100,000 volumes, and is now attended by about 250 students. The population of the city is about 8,000. It is the Scottish headquarters of the game of golf. Its links are of ancient renown. The manufacture of golf clubs and balls is a characteristic industry. See GOLF; SCOTLAND.

St. Augustine, sānt aw′gus-tēn, the county seat of St. John County, Florida. It is the oldest European settlement in the United States. It was founded by the Spaniards under Menendez September 8, 1565, forty years before the settlement of Santa Fé. Twenty years later it was plundered by Drake, but it remained under Spanish rule for two centuries. During the Revolutionary War, it was occupied by the British as a military depot, but was restored to the Spanish in 1783. In 1821 it passed with Florida to the United States. The city is situated on the seacoast, about thirty-six miles southeast of Jacksonville. It is built on a narrow, sandy peninsula about twelve feet above sea level. The seashore is defended by a coral wall with granite coping. The entrance to the peninsula was defended by the Spaniards by a wall. The old gate, with a few feet of wall on either side is still standing.

The streets are narrow. Saint George, the main thoroughfare and widest street, is only seventeen feet in width. The balconies of the old Spanish houses overhang the streets, and in many cases they almost meet. Many of the old Spanish buildings are still in a good state of preservation. The old fort of San Marco, now Fort Marion, is occupied by the United States government. It has the form of a trapezium and covers about four acres. In its time it was considered a model of military architecture. There are moats and outworks. The walls are twenty-one feet high, with bastions at the corners. There are heavy casements, dungeons, and subterranean passages. The fort, as well as the other principal buildings of the city, and the walls mentioned are composed of a shelly conglomerate, known locally as coquina (kō-kee′na), quarried on Anastasia Island in the harbor. It is quarried easily, but hardens on exposure to the air. The same material is crushed for pavements and boulevards.

In the center of the city there is an open place known as the Plaza. An old cathedral, which formerly stood here with a Moorish bell tower, was injured by fire, but the front remained almost uninjured, and was incorporated into a new structure. The old church bell, bearing the date of 1682, was also preserved.

The city is noted for beautiful shaded walks and magnificent boulevards. The mildness and evenness of the winters has made St. Augustine famous as a winter resort. The permanent population of the city is about 5,000. From 10,000 to 25,000 tourists, however, pass the winter here. The Ponce de Leon Hotel, built at a cost of over $2,000,000, is one of the finest edifices of the sort in the world. It is surrounded by spacious verandas. Mural decorations within give a pictorial history of the adventures of the Spaniards. The chief local industries are lumbering and fishing. St. Augustine may be reached by boat or by the Florida East Coast Railway *via* Jacksonville.

St. Bartholomew, Massacre of, in French history, a slaughter of Protestants by the Catholics on the night of St. Bartholomew's Day, August 24, 1572. France had been plunged into civil war, but at this time the Protestants and Catholics were nominally at peace. They were engaged in bitter strife for the control of the government. Assassinations had been perpetrated by both sides, and party feeling ran high. Catherine de Medici, the mother of the king, is blamed for the guilty deed. A midnight bell gave the signal. The Catholics fell upon their neighbors unawares. De Coligni, the venerable leader of the Huguenots, and many thousand Protestants were slain. Companies of soldiers ran from house to house butchering and killing, flinging the dead bodies of the slain into the streets. The butchery was continued for a number of days, and orders were sent into the provinces to exterminate root and branch. To their credit, be it said, many governors refused to stain their hands in the blood of their fellow citizens. The massacre belongs to a bloody period of history and is not to be judged by modern standards. It was due to a mixture of bigotry and political passion. The feelings of the excitable French people were no doubt played upon by the Italian advisers of the queen, who persuaded them that their lives, and the very existence of France, were in danger. At Rome, the slaughter was reported as a great victory over a conspiracy of the Huguenots who had banded together to murder the king and establish the Protestant religion. The authorities accordingly ordered the *Te Deum* to be chanted and a medal struck off commemorating the glorious event. Authorities estimate the number of slain variously at from thirty to seventy thousand. See COLIGNI; HUGUENOT; CATHERINE DE MEDICI.

St. Bernard. See BERNARD.

St. Bernard Dog. See BERNARD; DOG.

Saint Boniface, Manitoba, the county town of Provencher County, is on the Red River directly opposite Winnipeg, and on the National Transcontinental, Canadian Northern and Canadian Pacific railroads. The city also has interurban electric connection with Winnipeg and other cities. Saint Boniface is rapidly increasing in importance as a manufacturing center, having factories for the production of paint, finished marble, glass, tar paper, leather, linseed oil, flour, sash and doors, finished lumber, bricks, packing house products, creamery products and brewery products.

Saint Boniface is the seat of a Roman Catholic archbishop and has a Roman Catholic cathedral, numerous churches and such denominational institutions as Saint Abelard's Orphanage, Convent of the Sisters of Jesus and the Juniorate of the Oblate Fathers. Saint Boniface College is located here, together with a boys' academy, a normal school, collegiate institutes and a seminary. The city has several attractive parks and a public library. In 1921 the population was 12,821.

Saint Clair, Arthur (1734-1818), a noted American soldier, statesman and territorial governor, was born at Thurso, Scotland. He was educated at Edinburgh University, joined the British army as ensign, and in 1758 emigrated to America. In the French and Indian Wars, General Saint Clair served with honor against Louisburg and Quebec. In 1762 he resigned his commission in the British army, and settled in western Pennsylvania two years later. Joining the Colonial Army with the rank of colonel in 1776, he served gallantly in the battles of Three Rivers, Trenton and Princeton. He was raised to

in command of Fort Ticonderoga, and was later deprived of his command for surrendering the fort to Burgoyne. After that he fought as a volunteer, and again rose to prominence. General Saint Clair was elected to the Continental Congress in 1785, became its president in 1787, and in 1789 was appointed the first governor of the Northwest Territory. Sent at the head of the United States army against the Miami Indians in 1791, General Saint Clair's forces were routed. His conduct was investigated, and he was exonerated; but in 1792 he resigned his military command. In 1802 he was removed from his civil office, and died in poverty and obscurity sixteen years later.

St. Christopher. See CHRISTOPHER.

Saint Cloud, săn klōō′, a village of France. It is situated on the left bank of the Seine, a mile or two below the walls of Paris. It may be reached from the center of the city by a ten-cent carfare. The village itself has a population of about 9,000 people. It is separated from Sevres by a beautiful wooded park in which the chateau of St. Cloud stands. The chateau was built in 1572. Louis XIV gave it to his brother, the Duke of Orleans. Louis XVI presented it to Marie Antoinette in 1782. It has been from time to time a favorite residence of French monarchs. Henry III was murdered here in 1589. Peter the Great was received here as an honored guest in 1717. It was Napoleón's residence when he was declared first consul. Blücher, his German conqueror, fixed his residence here in 1815. Napoleon III signed the declaration of war against Germany at Saint Cloud in 1870. During the sieges of Paris that followed, the palace suffered severely. The country surrounding the village is practically a suburban residence district of Paris. It is reached readily by tram-car, steamboat, and rail. See PARIS.

Saint Cloud, Minn., the county seat of Stearns County, is on the Mississippi and Sauk rivers and on the Northern Pacific and Great Northern railroads, 65 miles northwest of Minneapolis. Near the city are extensive and valuable granite quarries, and the preparation of this stone for the market is the leading industry. Hydroelectric power is available, and there are manufactories of bricks, flour, iron, lumber products, paper, and machine shop and foundry products.

Saint Cloud has good public schools, a Carnegie library, a state teachers' college, a Federal building, a home for the aged, a Roman Catholic cathedral and a state reformatory. It was founded in 1852 and was chartered as a city sixteen years later. In 1920 the inhabitants numbered 15,873.

Saint-Cyr, Laurence Gouvoin (1764-1830), a famous marshal of France, who was born at Toul. His first experience in the army was obtained in 1892, when he fought courageously under Custine in the wars on the Rhine and in Holland. After the officials had realized his ability in the military line, he was sent to succeed Massena in command of the French troops in Italy. There he proceeded to reorganize the army in such a thorough and systematic manner that in the campaigns that followed, he won many laurels for his country. Hastening from Italy to Germany, he became Moreau's lieutenant in 1800 and won a decisive battle at Biberach.

Realizing his military powers, Napoleon now sent him to Spain, from which he returned to Italy in 1803 as commander of the army of occupation in Naples. In 1809 he lost Napoleon's favor, and resigned from the army. In the war with Russian in 1812 they could not overlook his evident ability, however, and he was once more reinstated. He justified Napoleon's trust by a brilliant victory at Polotek. After the overthrow of Napoleon he was Minister of War for two terms.

St. Denis, săn dnē′, a town of France. It is situated on the Seine four miles below Paris. It is a manufacturing city of importance, having a population of about 65,000. It is noted, however, chiefly for the venerable abbey in which the kings of France have been buried. The town was named for St. Denis, the first bishop of Paris. He is said to have suffered martrydom. A chapel was erected above his supposed grave about 275. A large basilica took its place about 638. The present edifice dates from 1121-44. It has been repaired at different times. In shape it is rectangular, with a semi-circular choir or sanctuary at one end.

It is celebrated for rose windows and other architectural features, including the earliest pointed arches known. It is noted chiefly for the tombs of French monarchs and members of the royal family from the time of Dagobert to Louis XVIII. In 1793, actuated by hatred for all things royal, the French Convention ordered the tombs of the French monarchs demolished. The work was intrusted to a wretch who broke open and defaced the tombs, melted down metal statues, and flung the bones of a hundred kings and royal persons into a common ditch. Louis XVIII restored the monuments and repaired the damage as far as possible. Some of the tombs are now in good repair. Of others, scarce a vestige is left. Among the more noted tombs are those of Pepin, Clovis, Catherine de Medici, and Francis I.

Saint Elmo's Fire, an electrical appearance sometimes seen, especially in the southern hemisphere during thunderstorms. It not infrequently takes the form of a globe of fire, playing about the top of a ship's mast, a church spire, or even a tree. The phenomenon is regarded as a discharge of electricity into the air. It may even be seen about the head of a person. The Greek sailors regarded St. Elmo's Fire as an omen of fair weather, weaving it into their legend of Castor and Pollux, by which names the phenomenon is often designated. The name Elmo is probably a corruption of Erasmus, which, in an Italianized form, appears as Ermo or Elmo. This saint is regarded in the Mediterranean as the patron of sailors. The phenomenon is called also corposant, and composant, from *corpus sanctum*. See CASTOR AND POLLUX.

St. Etienne, săn ta-tyĕn′, a manufacturing city of France. It is located on the Rhone, about thirty-six miles below Lyons. There are immense fields of what is said to be the best smelting coal in the world. Iron ore is obtained readily. As a center of steel and iron manufacturing, the city holds much the same relation to France that Pittsburgh has in the United States. The large castings, ship armor, and machinery of France come largely from St. Etienne. It is also headquarters for firearms, including rifles and revolvers, and for cutlery, files, nails, bolts, anvils, and vises. St. Etienne was the original seat of the silk ribbon industry in western Europe. It still leads the world in the production of ribbons and silk trimmings. Forty thousand persons are engaged in the industry. The population in 1921 was reported at 167,967. See SILK; LYONS.

St. Gall, a canton and also a city of Switzerland. The canton lies between Lake Constance and Zürich. Roughly speaking, it has the form of a ring, completely encircling the canton of Appenzell within. The capital is St. Gall, a manufacturing town of 54,000 people. The inhabitants are engaged chiefly in the manufacture of lace and cotton embroidery. Nearly every household in the city and in the adjacent villages for miles is engaged in this industry. The exports for 1907 amounted to nearly $36,000,000. American merchants import from $5,000,000 to $15,000,000 worth of St. Gall laces and embroideries annually. With the exception of Madrid, it occupies the most elevated position of any considerable town in Europe. A stone pillar in the marketplace informs the passer-by that the height above the sea is 2,196.6 feet. The mean annual temperature, 45.6; annual rainfall, 50 inches; air-distance from Zürich, 39 miles; from Geneva, 174. The town is famous for the ancient Benedictine abbey of St. Gall. It was founded in the seventh century by St. Gallus, an Irish monk. It was suppressed in 1805. During the Middle Ages, particularly from the eighth to the tenth centuries, the abbey of St. Gall was one of the most famous seats of learning in Europe. It was one of the institutions that preserved the learning of the ancients from being lost. The library still preserves over 400 manuscripts, none of them written later than the year 823. Several of the classics, including the works of Quintilian and other Latin writers, are known to the world of scholarship only through manuscripts preserved in the library of this abbey. One precious old document is a copy of the Nibelungenlied. See BELL; MONASTERY; SWITZERLAND.

Saint-Gaudens, Augustus, the greatest of modern sculptors. Saint-Gaudens was born in Dublin, Ireland, in 1848. His father was French; his mother, Irish. His

parents brought him to New York in infancy. At the age of thirteen, he was apprenticed to a cameo cutter. At nineteen he had the good fortune to go to Paris and study in the French School of Fine Arts. Returning to America he established a home at Cornish, Vermont, where he died August 3, 1907. Saint-Gaudens is no doubt the greatest American sculptor. He studied his art abroad and part of his work was done abroad, but through it all he was American in thought and American in sympathy. His first work of note was a Hiawatha. His favorite productions were American: Admiral Farragut in Madison Square, New York City; the Shaw monument at Boston; an equestrian statue of Sherman in Central Park, New York; the statue of Abraham Lincoln in Lincoln Park, Chicago; and, perhaps greatest of all, the Puritan, a memorial statue erected in honor of Deacon Chapin at Springfield, Massachusetts. In all these, merely the more notable of his American subjects, St. Gaudens exhibits sincerity, power, and nobility of feeling. He is never weak. He shares with the cartoonist the gift of catching the popular belief, and expressing the popular conception of his subjects. We feel that one of ourselves has wrought Sherman and Lincoln and the Puritan in lasting bronze. Although intensely American, Saint-Gaudens enjoyed an international reputation. He fashioned a figure of Robert Louis Stevenson for the city of Edinburgh, and a tablet, *Amor Caritas,* for the French Luxembourg. See SCULPTURE.

St. Germain, a town of France. It is situated on the Seine, a few miles below Sevres and Saint Cloud. The castle and terrace of St. Germain command the valley of the Seine, and afford one of the finest views in Europe. The ancient castle, now a museum of antiquities, was a favorite residence of the French monarchs; whence the French court was called the Court of St. Germain, just as the English court is still called the Court of St. James from the palace of St. James, London. Louis XIV, Margaret of Navarre, and other royal personages were born here. After the English Revolution James II of England and other members of the Stuart family lived here in exile in a sort of dependence on the French king. The royal buildings are now used as barracks and as a military prison. See ST. CLOUD; ST. DENIS; VERSAILLES; PARIS.

St. Gotthard, sānt gŏth′ard, a group of mountain peaks in the central Alps. The pass of St. Gotthard lying at its foot is a lofty, barren valley leading from Lake Lucerne to the valley of the Ticino on the Italian side. The greatest altitude of the pass is a trifle less than 7,000 feet. As in the famous pass of St. Bernard, shelter is afforded by a hospice. At certain seasons of the year the traveler is exposed to snowstorms and avalanches. Up to the beginning of the present century, this was the most frequented of the Alpine passes. In 1832 an excellent carriage road was constructed. The importance of having direct railway communication between Germany and Italy led to the construction of the great St. Gotthard railway tunnel. The tunnel was begun in 1872 at both ends. Eight years were required to complete the work. Two thousand five hundred workmen were employed daily. The cost was $11,350,000. This tunnel is nine and one-fourth miles in length. The central point is 3,786 feet above the sea level. It passes directly under the village of Andermatt, and its middle point is 6,076 feet below the crest of a mountain. The tunnel is twenty-eight feet broad and twenty-one feet high. It has a double line of rails. Trains require twenty minutes to pass through the tunnel. A current of fresh air passes through constantly, so that it is unnecessary to close the car windows. Powerful lanterns, fourteen in all, are hung at intervals to light the way.

Scarcely less interesting than the pass and the tunnel are the engineering methods adopted to enable trains to reach the entrances of the tunnel. The valley of the Ticino, on the Italian side, as well as that of the northern stream, which empties into Lake Lucerne, is too steep for railway trains. The track has been lengthened in each case by excavating spiral tunnels in the sides of the valleys. The train enters a tunnel in the solid rock, passes around an interior loop, and reappears at a point over the spot where it entered the mountain side. There are no less than three of these

underground spirals on the Lake Lucerne side of the mountain. There are four in the valley of the Ticino. Each of these interior loops gives the railway an increased length of a mile or two, and enables the track to rise correspondingly.

See TUNNEL; CENIS; SIMPLON.

St. Helena, an island in the Atlantic 1,200 miles off the west coast of Africa. It is a volcanic cone rising from the bottom of the Atlantic and terminating in a plateau 2,700 feet above sea level. At the time of its discovery in 1502 the island was covered with heavy forests of ebony and other valuable trees, but the combined efforts of the goat and the lumberman have reduced the heights to a rain-washed barren. Before the opening of the Suez Canal, St. Helena was in the route of ships bound for Cape Town, Australia, and India, and was an important place of call. It is still a naval coaling station. Area, 47 square miles; permanent population, 3,000; soldiers, 1,532; churches, 8; schools, 8; imports, $500,000 a year. A postal system is reinforced by telephone lines and eighty miles of telegraph lines. An ocean cable touches the island on its way to Cape Town. In 1651 the island was occupied by the East India Company and later became a British possession. In 1815 Napoleon was banished to St. Helena. He died here in 1821. During the late South African War 5,000 Boer prisoners were held here until the close of hostilities. See NAPOLEON.

Saint Hyacinthe, Quebec, the county town of Saint Hyacinthe County and a port of entry, is on the Yamaska River and on the Grand Trunk, Intercolonial, Quebec, Montreal & Southern, Canadian Pacific and Canadian National railroads, 36 miles east of Montreal. It is as an industrial center and educational center that Saint Hyacinthe is important. Hydro-electric power is available, and from the factories of the city issue leather, flour and grist, corsets, agricultural implements, plows, gloves, boots and shoes, organs, threshing machines, spinning wheels, cotton goods, phonographs and liquors.

The educational institutions are the Great and Little Seminary, with higher classical course, normal school for girls, Saint Hyacinthe Academy, provincial dairy school, the Academie Prince, Academie Girouard, nine primary public schools, a branch of Sacred Heart College of Arthabaska, three libraries and several monasteries and convents. The city is the seat of a Roman Catholic bishop and has a large cathedral. Wide, shaded streets, three parks and the beautiful Boulevard Girouard add to the attractiveness of Saint Hyacinthe, and its future growth is assured. Population, 1921, 10,859.

Saint Jean, Quebec, an industrial city and the county town of Saint Johns County, is on the Richelieu River and on the Grand Trunk, the Central of Vermont, the Delaware & Hudson, the Rutland, the Quebec, Montreal & Southern and the Canadian Pacific railroads, 27 miles southeast of Montreal. Industrially, Saint Jean is constantly becoming more important; it now has factories for the production of sanitary pottery, corrugated steel pipe, furniture, wax tapers, fog signals, pads and felts, dressed and dyed fur, dairy supplies, sash and doors, railway signals, foundry and machine shop products, and other articles. A large trade in grain, lumber and general farm produce is carried on.

Saint Jean has primary public schools and a high school, a convent, hospital, park, four churches and four hotels. A national highway between Montreal and New York state passes through the city. In 1920 the population was 7,734.

Saint John, New Brunswick, the county town of Saint John County and a port of entry, is on the Bay of Fundy at the mouth of the Saint John River, 275 miles northwest of Halifax. Transportation by rail is provided by the Canadian National, Canadian Northern and Canadian Pacific railroads. Saint John harbor is open all year; at the harbor entrance the channel has a depth of 32 feet at low water and about 59 feet at high water. The harbor is well provided with loading berths, cargo sheds, grain elevator with a combined capacity of 2,250,000 bushels, a dry dock and ship repair plant, and deep water wharves. The city has direct steamer connection with Liverpool, London, Dublin and other European points, and it is the most important Canadian Atlantic winter port.

DESCRIPTION, BUILDINGS, INSTITUTIONS. Saint John is built on a rocky peninsula facing the harbor; the Saint John River is here spanned by a steel cantilever railroad bridge and by a highway steel arch bridge. The most notable of the city's buildings are the terminal buildings of the Canadian Pacific and the Canadian National railroads, court house, jail, Royal Dufferin and Victoria hotels, armory, custom house, exhibition building, Y. M. C. A., theaters, club houses, churches and office buildings. More than 500 acres of land have been converted into public parks and gardens.

Important among the educational and other institutions are the Alexandra, Lorne, King Edward, King George, St. Vincent's, St. Peter, Victoria, Albert and high schools, Natural History Museum, public libraries, Health Center, general and tuberculosis hospitals, hospital for nervous diseases, Nurses' Home, Seamen's Institute, and the Home for Aged Females.

INDUSTRY. Saint John is the commercial center for the southwestern section of New Brunswick, and the more important manufacturing establishments produce brushes and brooms, paper and wooden boxes, leather, cotton goods, vinegar, sugar, sardines, lime and bricks, flour and grist, engines, boilers, steel, wood pulp, lumber, cigars, soap, edge tools, ships, paint and fertilizer. Other commodities are made here, and the city's industrial importance increases with its commercial importance.

HISTORY. In 1604, on the feast day of Saint John the Baptist, Champlain, Pontrincourt and De Monts landed here. No settlement was established for some years; the French and British fortified the mouth of the river; and in 1783 a colony of 3,000 United Empire Loyalists settled here. Saint John was the first Canadian city to adopt the commission form of government, and the initiative, referendum and recall are in effect.

Saint John River, the chief stream of the province of New Brunswick, rises on the boundary between Maine and Quebec. At first it flows northeastward through northern Maine, then makes a sweeping curve and flows eastward on the Maine-New Brunswick boundary; finally it flows into the Bay of Fundy at the city of Saint John. The river is approximately 500 miles long and drains about 22,000 square miles of territory. Its largest tributaries are the Aroostook and the Allegash, Mafawaska, Tobique and Nashwaak.

The Saint John is a picturesque stream and flows through beautiful, wooded country for most of its length. Three miles—inward into Canada from the international boundary it plunges in the Grand Falls over a perpendicular rock 75 feet high, and in the next mile the rapids decline so sharply that the river falls another 75 feet. In the last 100 miles the Saint John is wide, sinuous and islanded. Just before the Bay of Fundy is reached the bed of the stream contracts into a gorge 400 feet wide with a fall of 17 feet, and here is to be seen a curious phenomenon. At low tide the level of the river above the gorge is 12 feet higher than the harbor level; but here the tide runs extremely high, and at high tide the harbor level is five feet higher than the river level, and the water flows from the harbor upward into the river. These are the famous "reversing falls" of the Saint John.

At the peak of the high tide steamers pass through the gorge into the river. Large vessels ascend 80 miles to Fredericton; smaller ones go to Woodstock, 145 miles from the river mouth, when the tide is low, and to the Grand Falls, 225 miles, when it is high. Small steamers also ply the river for 40 miles above the Grand Falls.

Saint Johns, the capital city of Newfoundland, is situated on the Atlantic side of the Avalon peninsula, on the southeastern end of the island. It is built for the most part to the northward of the harbor, which is deep and landlocked; causeways and bridges connect the north and south sides of the city. Saint Johns is the largest city and the principal commercial and industrial center of Newfoundland. The harbor has been greatly improved and is fitted with a dry dock, wharves, warehouses, loading sheds and a marine railway. In the city are manufactories of leather, whale and seal oil, ship's bread,

THOUSAND ISLANDS, ST. LAWRENCE RIVER

LAKES AMONG THE CLOUDS—Alberta

iron ware, fishing nets, furniture, cordage, boots and shoes and liquor. A large export trade in seals, codfish, oil and fish fertilizer is carried on. One of the most conspicuous buildings is the Roman Catholic cathedral. There is also an Anglican cathedral and numerous churches, Parliament buildings, post office, government house, Saint Bonaventure College and other schools, and a custom house.

Saint Johns was founded by Sir Humphrey Gilbert in 1582, and was taken by the French in 1696, again during the Seven Years' War the French came into possession, but the city and colony were finally secured to the British in 1763. At the last census the population was given at 34,045.

St. Joseph, Mo., the third city of the state and the county seat of Buchanan County, is on the Missouri River and on the Atchison, Topeka & Santa Fe, Chicago, Burlington & Quincy, Chicago, Rock Island & Pacific, Missouri Pacific, Union Pacific, Great Western, steam, and two interurban electric, railroads. It is 132 miles south of Omaha and 60 miles north of Kansas City.

The city, which has an area of more than thirteen square miles, is built on the high bluffs that border the river, and has a river frontage of more than three miles. It is beautified by a number of parks, among which are Krug Park, Bartlett Park and Corby Grove. Noteworthy buildings are the city and county buildings, post office, Memorial Home for Aged People, Y. M. C. A., United States Weather Bureau station, Home for Little Wanderers, Noyes Hospital, Missouri, Methodist and Ensworth hospitals, State Hospital for the Insane, and the Live Stock Exchange. A state fish hatchery is maintained here.

The educational institutions comprise good public graded and high schools, Sacred Heart Academy, parochial schools, special and commercial schools, Christian Brothers' College and a number of private schools.

Saint Joseph is one of the great live stock markets of the United States, the extensive yards and many packing houses being the principal industrial establishments. Other important manufacturing establishments are flour mills, feed mills, textile mills, stationery, paper and fabric sack and bag factories, candy, trunk factories, shoe factories, foundries, clothing factories and agricultural machinery factories. Live stock, grain and fruit are the most important articles of commerce. It is a great jobbing center.

A fur trading post was established near the present city in 1826; four years later the post was moved to what is now the heart of the city and a settlement soon grew up around it. In 1840 a post office was established, and three years later the settlement, called at that time Blacksnake Hills, had 500 inhabitants. Before 1846 the present name was adopted; in that year it became the county seat, and a city charter was secured in 1853. Saint Joseph was an outfitting point for miners going into the west, and in 1860 and 1861 was the eastern terminus of the pony express. In 1920 the population was 77,939.

St. Lawrence, a river and gulf of North America. The St. Lawrence system occupies one of the great drainage basins of the world. The area is about 530,000 square miles. The water surface of the gulf, the river, the Great Lakes, and their tributaries falls little short of 260,000 square miles. From the source of the St. Louis River in Minnesota to the mouth of the gulf at Anticosti Island the total distance is about 2,200 miles. In direction and location, the St. Lawrence of North America corresponds to the Amazon of South America. Named from the source to the mouth, the different portions of the true St. Lawrence system are known successively as the St. Louis River, Lake Superior, Sault Ste. Marie, Lake Huron, St. Clair River, Lake St. Clair, Detroit River, Lake Erie, Niagara River, Lake Ontario, the St. Lawrence proper, and the Gulf of St. Lawrence. All in all this is the greatest body of fresh water on the globe.

The gulf is a deep estuary formed by the subsidence of the coast. It is, in fact, a drowned river. For length, breadth, and depth the estuary is the greatest in the world. The main channel extends inland a distance of 250 miles to Quebec, affording passage to the largest seagoing vessels.

Ships of considerable size ascend as far as Montreal. Navigation above that point is facilitated by means of canals. The chief tributaries of the St. Lawrence proper are the Ottawa and the Saguenay on the Canadian side, and the Richelieu from the American side. The descent from Lake Ontario to Quebec is about 230 feet. Immediately below Lake Ontario the river is divided into numerous channels by the Thousand Islands. There are between 1,000 and 2,000 of these islands. They are beautiful spots of verdure. The locality is noted as a summer resort. A few miles above Montreal occur the rapids of Lachine. The total descent is only forty-five feet, but the current is very swift, and shooting the Lachine Rapids is a favorite amusement of summer tourists. The volume of the St. Lawrence varies but slightly with change of season.

See MONTREAL; QUEBEC; SAGUENAY.

St. Louis, the metropolis of Missouri, in population, the seventh city of the American Union. It occupies a rolling tract on the west shore of the Mississippi, twenty miles below the mouth of the Missouri. It has a river frontage of nineteen miles. The river bank is paved with cobble stones and is provided with floating wharves for steamboats. Passenger packets run up the Mississippi as far as St. Paul and ply regularly to New Orleans and Cincinnati. The river business has fallen off of late and is confined chiefly to the transportation of coal and other heavy freight. Twenty-seven lines of railway reach the city. Most of the eastern trains enter over the Eads Bridge, one of the most remarkable railroad bridges in the world. Others cross by means of the Merchants' Bridge, a few miles above.

All passenger trains use the Union Station. It is one of the largest and best arranged stations in the world. The cost of the structure was $4,500,000. Each train backs into the mammoth train shed and stands upon one of thirty-two parallel tracks. The trains stand at the street level. Incoming passengers pass out through an elegant waiting room. All mail and express matter is dropped by means of elevators to subterranean passages below, where wagons wait to receive it. The building is owned by a company in which the various railroads are stockholders. The cost of operation is charged up to the railroads according to the number of cars run in and out of the station. It is understood that the annual charge per car is somewhere between one and two dollars. The cars of suburban trains that make frequent trips are counted at one-third of their actual number.

A somewhat similar arrangement has been effected for handling a great part of the railroad freight of the city. A large number of the heaviest shippers rent quarters conveniently arranged along a system of platforms provided with switches, elevators and trucks, all under one local management. Cars of incoming freight are delivered at this depot. Employes of the depot unload the cars, place the freight on trucks, and deliver the trucks at the doors of the various receivers. In like manner, the shippers load trucks at their doors and deliver them to the depot employes, who, in turn, load cars. There are hundreds of employes and a seemingly endless number of trucks, all moving at the same time. A strict system prevails, however. Both railroads and shippers are able to depend to a minute on the time schedule which has been arranged. The advantages of such a system are manifest. A merchant who has goods coming in by several different railroads has them all delivered at the door of his warehouse with the utmost dispatch. All that a wholesaler desiring to ship over a dozen freight lines has to do is to pile the goods on as many different trucks and to push them when loaded to the door of his warehouse. The employes of the depot attend to all details of loading and bring the merchant his receipts from the various railroads. This freight depot is known as the Cupples depot. It was designed by Samuel Cupples and Robert Brookings, two wealthy merchants. They have given the entire premises, together with several adjacent blocks in which shippers have warehouses, to Washington University, the leading educational institution of the city.

In many other respects, the affairs of the city are managed on a high plane. Water is pumped from the Mississippi River, near the mouth of the Missouri, into immense

settling tanks from which is is forced in turn into the city mains and into an elevated reservoir; although the water of the river during spring freshets has a turbid yellow appearance, it always comes from the settling tanks as clear and sparkling as crystal and is of the best quality.

The city has many large hotels, including the Jefferson, Statler, Chase, Melbourne and Cliredge. The United States custom house and postoffice, courthouse, Merchants' Exchange, Railway Exchange, City Club, Arcade, Pierce, Chamber of Commerce and Federal Reserve buildings are imposing structures.

There are more than 200,000 volumes in the Free Public Library. Andrew Carnegie gave the city a million dollars for the erection of a new building. The Mercantile Library, designed originally for the use of clerks, owns thousands of volumes. It is one of the pleasantest reading rooms in the United States.

St. Louis' fine system of public schools is recognized as one of the best in the country and is housed in buildings unsurpassed for beauty, solidity of construction, safety and adaptability to their purpose. There are two teachers colleges; the William T. Harris for white and the Sumner for colored young women who are preparing to become teachers. The high schools are the Central, Cleveland, McKinley, Soldan and Yeatman for white pupils and the Sumner High School for colored pupils.

Other units of the system are: the junior high school, classes for boys whose interests lie wholly in manual work; open air schools; classes for wards of the juvenile court; classes at the City Hospital; the Koch Hospital, where children in the incipient stages of tuberculosis receive regular classroom instruction; the House of Detention; the City Sanitarium for the Insane; a class at Ridge Farm, composed of convalescents from the Childrens Hospital—located some thirty miles from the city; thirteen special schools; and 107 regular elementary schools—a total of 142 educational units. Classes for juvenile court wards—delinquent and neglected boys—are conducted at Bellefontaine Farm, a large tract of land beautifully situated on an eminence about eight miles from the city, close to the junction of the Missouri and the Mississippi.

An educational museum containing approximately 150,000 specimens is a part of the public school system, the whole of which represents a total in school property of all kinds of between $25,000,000 and $30,000,000 in value.

Washington University, already mentioned, is a heavily endowed, thrifty institution of higher learning. It possesses the usual schools of law, engineering, medicine, dentistry, etc. There are also several preparatory schools and colleges under private and public management, including St. Louis University and the College of Christian Brothers—Catholic institutions. Mary Institute is a school for young ladies.

The manufacturing interests of St. Louis are extensive. Among the important manufactures are those of iron, steel, glass, flour, sugar, bags, tobacco, breakfast foods, boots and shoes, furniture, sash and doors, carriages, wagons, foundry products, hardware and agricultural implements. St. Louis is also a center of the meat-packing industry. The red brick manufactured in the city is of excellent quality.

Taking river and rail together, the amount of freight that passes through St. Louis is enormous. It is an important center in the handling of coal, wheat, flour, tobacco, cotton, sugar, salt, lumber, live stock and other heavy freight. The coal docks are capacious. The capacity of the grain elevators reaches far into the millions. St. Louis is the leading American market for hardwood lumber.

A French trading post was established on the present site of the city in 1764. In 1803, when the United States came into the possession of St. Louis by the cession of Louisiana, the population of the town had grown to about 1,000, half of whom were Negroes. There were at this time about 200 houses, occupying one or two crooked streets parallel to the river. Thirty years later the population was about 6,000. The development of the Missouri country and the overland trade with Santa Fe gave St. Louis its real start. In 1920 the population was reported at 772,927. This figure

does not include thousands of residents who live just beyond the city limits.

See EADS; MISSISSIPPI; STEAMBOAT; SHAW'S GARDENS; LEAD.

St. Patrick See PATRICK, SAINT.

St. Paul, the capital city of Minnesota and the seat of Ramsey County. Its site is on the bluffs of the Upper Mississippi, a few miles below the Falls of St. Anthony, 1,915 miles from the Gulf of Mexico, and, at the levee, 695 feet above sea level. It is practically at the head of river navigation, although a series of government locks and dams are under construction with a view to permitting boats to reach the foot of the Falls. The city occupies a sightly area of fifty-five square miles and adjoins Minneapolis, the boundary between the Twin Cities, as St. Paul and Minneapolis are called, being the center of a street. This street is also the boundary line between the counties of Ramsey and Hennepin.

When first seen by white men an Indian village occupied a coulee, since locally known as Pig's Eye. The Indian name of the city was, by translation, "White Rock," having reference to the white sandstone cliffs which border the river. French traders visited the spot in 1658. In 1766 Jonathan Carver of Connecticut claimed to have made a treaty with the Indians according to which he was ceded Carver's Cave, including the present site of the city. During Jefferson's administration, Lieutenant Zebulon Pike purchased a considerable tract of land, now occupied by St. Paul and Fort Snelling, from the Indians for sixty gallons of whiskey. Congress afterward donated the Indians the sum of $20,000 in cash. By 1840 there were two hundred settlers, chiefly Frenchmen, who lived by hunting and fishing, and by trading with the Indians.

In 1849 St. Paul was designated the capital of the new territory. There were at that time thirty-two buildings. In the early settlement of the Northwest St. Paul was the central trading post, holding the key to communication with the East and to the trails and ox-cart routes penetrating the West. The early trade of St. Paul was transacted chiefly with Indians, French trappers, and the garrison of Fort Snelling. Both Indians and soldiers were supplied with whiskey. Groceries, clothing, ammunition, tobacco, fire arms, axes and other implements were exchanged for furs. In fact, the early prosperity of St. Paul was founded largely on the fur industry. It is still an important seat of the manufacture of furs, claiming in this respect to rank as the center of the native fur trade of North America. The furs of the Red River Valley of the North were brought here to market. The arrival of the first steamboat in spring and the coming of the French halfbreeds and Indians, with their creaking ox-carts and loads of furs and pemmican, were the events of the year.

The business portion of St. Paul of today is built in a valley flanked by hills that rise to a height of three or four hundred feet, and form a picturesque residential district from favored points on which a beautiful view may be had of the Father of Waters winding its way to the sea. The state capitol, an imposing building of architectural beauty, constructed mainly of white Georgia marble, crowns one of these hills. The capitol, which was over thirteen years in building, cost $5,000,000. American artists, including La Farge, Pyle, Volk, Blashfield, Simmons, Millet, Walker, Cox and Zogbaum have contributed to its decorations. A graceful dome rises 220 feet above the foundation. Upon a commanding site in the residence district stands a Roman Catholic cathedral, a beautiful structure built of native granite. The military reservation of Fort Snelling with its historic fort, the State Fish Hatchery and State Agricultural Fair grounds are other points of interest.

St. Paul has a system of picturesque and beautiful parks, having a total area of 1,478 acres. The most popular of these is Como Park of 425 acres inclosing two connected lakes; the most interesting historically is Indian Mounds Park overlooking the Mississippi, so called by reason of the characteristic monuments built by the aboriginal inhabitants of the region. Along the wooded bluffs of the Missisippi for one-third of its course through the city a driveway connecting with the principal streets

of a beautiful residence district has been laid out. A similar driveway on the opposite bank of the river gives a bird's eye view of the capital of the state.

St. Paul is entirely modern, with fine hotels, several Federal buildings, a public library, a Young Men's Christian Association building, a Young Women's Christian Association building, a country marketplace, and other improvements for which progressive western cities are noted. The city owns a public auditorium with a seating capacity of 10,500. Besides an excellent system of public schools there are in St. Paul several colleges and universities, including Hamline University, maintained by the Methodists, Macalester College by the Presbyterians, and St. Thomas, a military school maintained by the Catholics. It has both public and private hospitals and sanitariums. Its special pride is its public baths, for which an island in the Mississippi has been set apart. In addition to bathhouses with pools for both sexes, there are on the island outdoor gymnasiums for boys and girls, and a free day nursery. The city is supplied with water from several lakes in its vicinity whose natural supply is augmented by artesian wells. The system has been provided at a cost of $5,000,000. Eleven million gallons of pure water are supplied daily through 328 miles of mains. A network of sewers provides adequate drainage.

St. Paul is a natural railroad center. Ten trunk lines with 54,000 miles of track center here, making the Minnesota Transfer on the district midway between the two cities the entrépot for freight between the East and the West. The fact that all trains arriving at and departing from St. Paul use the Union Station, gives the city an advantage over its rival, Minneapolis, in the transfer of passengers.

St. Paul is a port of entry. The goods inspected here annually by the United States custom officers are valued at between $4,000,000 and $5,000,000. Tea shipped directly from Japan is a large item. St. Paul is an important distributing center for clothing, groceries and machinery. The wholesalers claim a business of $500,000,000 a year. There are important manufactures of furniture, stoves, hats, boots and shoes, macaroni and linseed oil. Meat packing is an important industry. The number of manufacturing plants, large and small, is over six hundred.

Henry Ford is building (1923) a factory to cover the northwest field for Ford automobiles. Their combined annual output is valued at $150,000,000. Fifty-two newspapers are published in St. Paul, several of these in German and Scandinavian. According to the United States census of 1910, the population was 214,744; in 1920, 234,595.

Saint Paul's, the large Episcopalian cathedral of London. It stands on a gentle elevation in the very heart of the city. It is London's most conspicuous building. It is exceeded in size by only two churches in Christendom, St. Peter's at Rome and the cathedral at Milan. It is so closely hemmed in by other buildings, however, that it is necessary to get away at some distance to gain an adequate idea as to its magnitude. The best view is said to be had from Blackfriars Bridge, one of the bridges which span the Thames. Up to the time of Shakespeare the site was a common place for meeting friends, for buying and selling, and for engaging servants.

The cathedral was designed by Sir Christopher Wren. It was begun in 1675 and was completed in 1710, during his lifetime. The total cost of the building was £747,954, equivalent at the present day to fully $10,000,000. The cost was met by a tax on incoming coal. During the process of construction the architect received a salary of £200 or $1,000 a year. The edifice is modeled on that of St. Peter's at Rome. In form it is a Latin cross with a large central rotunda over which a majestic dome rises. The dome is second only to that of St. Peter's, Rome. Seen from the floor the interior gives an impression of great height. According to custom, the cathedral occupies an east and west position, the top of the cross or choir pointing toward the east. Although a larger edifice, St. Paul's makes no such impression on the visitor as is made by Westminster Abbey. Statues of the apostles are placed over the north and south en-

trances. At each side of the west entrance or façade, as it is called, there is a campanile or bell tower. One of these contains the most musical peal of bells in London. The other contains the largest bell in England, "Great Paul," it is called. It was cast in 1882 and weighs eighteen tons. Visitors are admitted to the galleries and dome by a winding stairway, called the Geometrical Staircase. The interior of the dome forms a whispering gallery.

Monuments of many noted persons have been erected in the interior of the church, making it a sort of Hall of Fame, second in importance only to Westminster Abbey. Among those of interest are statues of, or other monuments to, Hallam, the historian; Samuel Johnson, the dictionary maker; Bishop Heber, the author of "From Greenland's Icy Mountains;" Admiral Howe, who took part in the blockade of the American coast during the Revolutionary War; Lord Nelson, the victor of Copenhagen, Nile, and Trafalgar; Cornwallis, who surrendered at Yorktown; Lieutenant-General Sir John Moore, who fell at Corunna; the Duke of Wellington, who won the battle of Waterloo; Sir Joshua Reynolds, the famous painter; and others. Beneath the church is a crypt, in which the sarcophagus of Wellington and that of Nelson, and the burial caskets of other noted persons stand.

See LONDON; WREN; WESTMINSTER ABBEY.

Saint Peterport, the leading city of Guernsey, on the Channel Islands. The city is also given the name of Saint Peter's or Saint Pierre. Its fortifications are Fort George, directly above it on a hill, and Castle Cornet, now connected with the city by a breakwater. Castle Cornet is built on a rugged islet thereabouts, and has had a famous history for the strong defenses put up against invaders in years past.

The town is picturesque and enjoys a position on the islands which allows it a commanding view. It was this spot which Victor Hugho chose for his residence from 1855 to 1870, and his home, Hauteville House, as well as many memorials of the great French author, are some of the showplaces of Saint Peterport.

Because of its location, it carries on an important foreign trade, especially with England, and many tons of locally grown fruit are transported annually. The town is well-equipped and modern, and has many educational facilities, including Elizabeth College. Population 20,000.

St. Peter's, Rome, the largest and most noted church in Christendom. It stands on the right of the Tiber, near the Vatican, two or three miles from the center of historic Rome. The approach to the church is an imposing open place. This space has the form of an ellipse and embraces several acres. It is surrounded by huge colonnades or covered drives. There are three of these circular drives under a single marble roof. The vaulting is supported by 284 columns and 88 piers. The whole place is called the Piazza. Including pavement, the cost of construction was $900,000. A 320-ton obelisk from Heliopolis, Egypt, stands in the center. The effect of the whole is striking, and prepares the visitor for the church.

St. Peter's, unlike St. Paul's, London, was a long time in building, and underwent serious changes in plan. By order of Pope Julius II the cornerstone was laid in 1506 in the presence of thirty-five cardinals. The main part of the edifice was consecrated in 1626 by Pope Urban VIII. The total cost is placed at $50,000,000. The original plan, by an Italian named Bramante, was that of a Greek cross having four wide, equal arms, surmounted by a vast dome. Michelangelo supervised the erection of the dome. It is one of the most imposing and best proportioned in existence. Unfortunately it was decided later to extend the west arm, or nave, thus giving St. Peter's the form of a Latin cross. The west portal, or front, cuts off the view of the dome. The interior is 205 yards in length. St. Paul's in London is only 173 yards. The nave is 151 feet high. The vault of the dome rises 404 feet above the pavement. A cross crowning the whole rises 31 feet higher. The dome is 138 feet in diameter. It is almost as large as the Roman Pantheon. It is spoken of as "the Pantheon in midair."

The interior of St. Peter's is lofty and beautifully proportioned. Pavement, pillars, and walks are of marble. The vault-

ing is in part stucco. The edifice is adorned with statues, monuments, and mural paintings beyond mention. The Madonna and the Crucifixion are prominent subjects. Naturally enough the memorials are chiefly those of saints, popes, and cardinals; but Charlemagne, Constantine, Henry IV of France, who abjured Protestantism, the last of the Stuarts, and others noted for service to the church are not forgotten. A round slab of porphyry on the pavement of the nave marks the spot where emperors were crowned. The frieze of the dome bears a Latin inscription in blue mosaic letters six feet high on a gold ground. The English translation is in the familiar words, "Thou art Peter, and on this rock I will build my church, and to thee will I give the keys of the kingdom of Heaven." Below in state is the sarcophagus which is revered by the Roman Catholic Church as containing the remains of St. Peter himself. It is surrounded by eighty-six golden lamps. They are always lighted. The dome may be ascended by a spiral stairway. The summit commands a magnificent view of the Apennine Mountains, the city, and the Tiber. Several small structures on the roof of the nave serve as homes for many of the mechanics and caretakers employed. It costs $35,000 a year to repair the building and care for it. The entire edifice covers 12,000 square yards,—two and one-half acres. There are so many chambers about the walls and chapels, in themselves huge churches, that St. Peter's is really a vast symmetrical aggregation of churches, chapels, tombs, and works of art. At the center of all, beneath the dome, is the high altar. Only the pope may officiate here, or a cardinal authorized by a papal brief.

See CATHEDRAL.

But thou, of temples old or altars new,
Standest alone—with nothing like to thee—
Worthiest of God, the holy and the true.
Since Zion's desolation, when that He
Forsook His former city, what could be
Of earthly structures in His honor piled,
Of a sublimer aspect? Majesty,
Power, glory, strength, and beauty—all are aisled
In this eternal ark of worship undefiled.

—Byron, *Childe Harold.*

The building of St. Peter's surpasses all power of description. It appears to me like some great work of Nature, a forest, a mass of rocks, or something similar, for I never can realize the idea that it is a work of man. You strive to distinguish the ceiling as little as the canopy of heaven. You lose your way in St. Peter's. You take a walk in it, and ramble till you are quite tired. When divine service is performed and chanted here, you are not aware of it till you come quite close.—Mendelssohn.

Saint Pierre, san pe-êr′, **Jacques Henri Bernardin de** (1737-1814), a French writer celebrated as the author of *Paul and Virginia,* one of the world's famous stories. Saint Pierre wrote other novels and several volumes of travels and miscellaneous essays. His reputation rests on *Paul and Virginia.* See PAUL AND VIRGINIA.

St. Pierre and Miquelon, mē-ke-lōn′, two islands ten miles off the southern coast of Newfoundland. By the treaty of 1783 they were retained in the possession of France as a fishing station. These islands, with ten or more adjacent islets, are the only remnant held by France of what was formerly known as New France. The total area is ninety-two square miles. Total population, 6,250. The town of St. Pierre on the island of the name has a good harbor. It is the American terminus of the French Atlantic cable. It is the center of an extensive codfishery. A fishing crew requires the use of a small ship and several boats known as dories. In the fishing season the men sail out of harbor for the Banks with a supply of salt and of small fish for bait. They set long trawl lines with buoys. Each trawl bears 3,000 shorter lines baited for cod. In the morning each dory passes along its trawl, taking up the cod and rebaiting. The cod are taken to the ship, where they are split open, washed, and laid down in salt. When bait gives out, the crew sails for home, secures more bait and more salt, and returns to the grounds. The fish are turned over to short-skirted women, who soak out the salt and scrub the fish more thoroughly than their husbands have done. The fish are then spread out on elevated frames to dry in the sun. Several acres of flat, clean rocks are also used for the purpose. In case of fog or rain, the drying fish are piled up and covered with tarpaulin until the sun comes out again. St. Pierre furnishes three-fourths of the codfish used in France.

Saint-Saens, Camille (1835-1921), was one of the greatest pianists and com-

posers France has ever produced. He began the study of music almost as early as his first lessons in school, and at the age of seven was taking advanced piano instruction. He entered the Conservatory of Paris five years later, and before he was sixteen he had won the first and second prizes in organ playing. Two years later he received the important position of organist in the Church of Saint-Merri, Paris.

Saint-Saens was granted one of the most responsible musical offices in all Europe, in 1861, that of organist in the Madeleine Church of Paris. During these years he had given much time to composing as well as playing. His *Noces,* a cantata, was awarded a prize by the International Exposition at Paris in 1867, but he did not succeed in having an opera accepted until 1872.

Sampson and Delilah, a Biblical opera, was produced at Weimar in 1877, and its popularity has steadily increased. Saint-Saens will probably always be better known for his symphonic poems, of which he wrote many, and for his graceful, brief composition for the piano.

St. Sophia, sānt sō-fē′ä, a celebrated church and mosque of Constantinople. It was founded by Constantine in 325, when he transferred the seat of government from Rome to that city. Several successive edifices have been destroyed and rebuilt. The present church was built by the emperor Justinian. Effort was made to make it the finest and most expensive church in Christendom. It occupies a square of 241 feet. The interior has the form of a Greek cross. The ceiling is composed of a series of domes rising one above the other. The central dome is 175 feet above the pavement. The chair of the patriarch, the highest official of the eastern church, was gilded with silver. The sacramental vessels were of pure gold. The altar cloths were of the richest stuffs, embroidered with pearls and gold thread. The altar itself is said to have been cast of gold in which were imbedded diamonds, sapphires, and other precious gems. This can hardly be, however, for its weight was said to be 160 tons. The reputed value of the altar was $65,000,000. The interior of the church was decorated with marble sculptures and beautiful mosaics, the most elaborate that the artistic world could at that time fashion.

When the Turks took possession of Constantinople, they converted St. Sophia into a mosque. According to the teachings of Mohammed, no likenesses of the human figure are permitted in places of worship. The building was prepared for Turkish services by plastering the interior with a deep coating of white. During a recent overhauling of the mosque, the plaster was removed. At the request of the German emperor, artists were permitted to copy the mosaics and sketch the statues. They have been covered up again, however, as before, with white plaster. It is to be hoped that the interior will be restored to its original beauty, now that the Turk no longer rules Constantinople with a free hand. Russia has often copied St. Sophia.

Saint Stephen, New Brunswick, is at the head of navigation on the Saint Croix River opposite Calais, Maine, and on the Canadian Pacific Railroad, 80 miles west of Saint John. With Calais, Maine and Milltown, New Brunswick, Saint Stephen has public utilities in common, the communities maintaining a single street railway system and gas, electrical and water systems. Hydro-electric and water power are used in the manufacture of soap, ladies' skirts, fertilizer, boxes, bricks, edge tools, shoes, confectionery and finished lumber. The population was 3,452 in 1921.

Saint Thomas, an island in the West Indies belonging to Denmark. It is situated about forty-three miles east of Porto Rico. The surface is hilly. Its chief town was at one time a center of West Indian trade. The inhabitants are chiefly negroes who make a living by raising sugar. St. Thomas, together with the other Danish islands, St. Croix and St. John, has an area of 138 square miles. The combined population is about 130,000. In 1870 a treaty was signed for the sale of these islands to the United States, but it was rejected by the United States Senate. In 1902 a second treaty was negotiated with the same end in view. It was rejected by the Danish legislature. The islands have suffered seriously from earthquakes and

hurricanes. They are of importance to the United States, chiefly by reason of their strategic position. Their possession by a strong nation would afford opportunity for the establishment of a naval station commanding, in a way, the approach to the prospective Panama canal.

Saint Vitus' Dance or **Chorea,** a disease affecting the muscles of the body and causing involuntary, convulsive muscular action. It generally arises without organic tissue change and is unaccompanied by localized pain. It is closely related to rheumatism and is often connected with anaemia. It is hereditary or epidemic, and sometimes chronic. It affects children of high nervous temperament and is more common to girls than to boys. The attacks are most frequent between the ages of five and fifteen. The cure is simple, consisting of exercise in the open, rest, and nutritious diet, with medical prescription of metallic tonics, if necessary. The return to a normal state comes as soon as the patient is enabled to control muscular action by the power of his will and coördinated systematic movements are obtained.

St. Valentine. See VALENTINE.

Sakhalin, or **Saghalien,** så-kå-lyēn′, an Asiatic island lying off the coast of Russian Manchuria. It is about 670 miles long, and from 20 to 150 broad. The area is about 24,500 square miles, equal to that of West Virginia. Geologically, this island is the most northerly in the arc of continental islands that inclose the Sea of Japan. Mountain ridges rise to a height of 5,000 feet. The intervening plains reach an altitude of 600 feet above the sea. One river is navigable by rafts and light boats for 250 miles. The soil consists of sands, marls, and clays. The island is clothed with forests, mostly coniferous. The range of altitude and latitude is such that the fir, the larch, the bamboo, elder, poplar, elm, wild cherry, willow, maple, ash, and oak are found in varying proportions. Fur-bearing animals, particularly the bear, the fox, and the sable are numerous. The reindeer ranges in the north. Tigers are met occasionally in the southern end of the island. The coast fisheries are valuable. The island is divided by an east and west boundary between Russia and Japan. In covering the Czecho-Slovakian retreat during the World War, Japan seized a town in the Russian half of the island. In 1920 the Russians turned upon and killed 600 Japanese, since when the Japanese have refused to relinquish control of the seized area. This has been the cause of continuous hostility between Russia and Japan, each desiring full control because of the island's strategic importance.

Sala, George Augustus Henry (1828-1895), an English journalist and author. He was born in London and began his career in life as a theatrical scene painter. He turned from etching and illustrating to literature, and in 1851 he became a contributor to Dickens' *Household Words.* He was a special correspondent for the *London Daily Telegraph* during the time of the Civil War and spent over a year in the United States. *A Trip to Barbary by a Roundabout Route* records his impressions of Napoleon III whom he followed to Algiers. He edited *Temple Bar* for six years. He wrote several works of travel, published a biography of William Hogarth, wrote novels, and visited America as a lecturer in the later days of his life. Some of his works are *Quite Alone, Captain Dangerous, Right Around the World, From Waterloo to the Peninsula,* and *London Up to Date.*

Salaberry-de-Valleyfield, Quebec, is on Lake Saint Francis, a St. Lawrence River expansion, and on the Grand Trunk and the St. Lawrence & Adirondack railroads, 30 miles west of Montreal. Valleyfield, as the city is usually called, has manufactories of cotton goods, gloves, dressed fur, clothing, gasoline motors, sashes and doors, flour and foundry and machine shop products.

Valleyfield is the seat of a Roman Catholic bishop and has a splendid cathedral, the most conspicuous building in the city. Other noteworthy structures are the post office, custom house, French academy, English academy, normal school, classical college and the library. The city was founded in 1874 and incorporated in 1904. Population, 1921, 9,215.

Saladin (1137-1193), a famous Arabian

sultan of Egypt and Syria. He served in Syria and became chief minister or vizier of Egypt in 1169. He overpowered a rival line of caliphs in North Africa and Syria, known as Fatimites, in 1171, and was proclaimed sultan in 1174. The Christians, who wrested the Holy City from the Mohammedans and established a kingdom at Jerusalem as the result of the earlier Crusades, annoyed the Mohammedan caravans on their way to Mecca. An atrocious massacre of Mohammedan pilgrims stirred Saladin to attempt the expulsion of the Europeans from Palestine. In the battle of Tiberias, fought on the plain of that name in 1187, he captured King Guy of Jerusalem and with his own scimitar cut down Chatillon, the guilty author of the massacre. He then took possession of Acre and other coast towns, and two years later recaptured the Holy City of Jerusalem. He was prevented from capturing Tyre by the arrival of help from Europe. Under Richard the Lion Hearted of England and Philip II of France, the Crusaders retook Acre and carried their victorious banners to the very walls of Jerusalem. A truce was then concluded whereby the Christians retained the coast with the privilege of visiting Jerusalem, which remained in the hands of the sultan. Saladin gained power by treachery and violence,—methods usual in the Orient,—but he exercised it wisely and for the good of his people. A favorable view of this ruler, and the knightly qualities which are popularly attributed to him, may be had from Scott's *Talisman*. See SARACEN.

Salamanca, a city of Spain. It lies on the banks of the Tormes, 172 miles northwest of Madrid by rail. An old Roman bridge, 500 feet in length, crosses the river here by means of twenty-six arches. The city was captured by Hannibal 222 B. C. It was taken from the Romans by the Goths and from the Goths by the Moors. It passed into the hands of the Spanish about 1055. The University of Salamanca was at one time the most important educational institution in Europe. In the thirteenth century it was attended, it is said, by 14,000 students. The library of 80,000 volumes is still in existence. There are two cathedrals of considerable note. In 1486, at the command of King Ferdinand, Columbus laid his projects before a learned council here. His plan for a voyage of discovery was rejected. The convent in which Columbus lodged still stands. The present population of Salamanca is about 25,000.

Salamander, a cold-blooded animal allied to the newt, toad, and frog. In mythology, the Salamander was a man-like monster who ate fire, breathed fire, and lived in fire without injury. Salamanders look like lizards but are not related to them. Zoölogically one cannot get a better idea of the salamander, and also of the newt, than to consider it a case of a frog, a huge frog in many cases, that has halted at the last stage of the tadpole and gone no further. Put another way, if the salamander would go a little further, shake off his tail, and change his body once more as the tadpole finally does, he would be a frog. The most common salamander in America is the spotted salamander, black above with a row of round yellow spots running along each side of the back. Six inches long. Tail, two and one-half inches. Another common species is dark brown with yellow blotches in cross bands. Eight inches long. Salamanders may be known from lizards because they have neither scales nor claws. Most of the species deposit their large eggs in water, others beneath stones. There are sixteen North American species—all pathetically harmless, helpless creatures.

The axolotl, a common type in both Mexico and the United States, has a velvety, swarthy skin, and is often seen in aquariums. There is a species which thrives in dark, damp caves, and is totally blind.

There is a monster-salamander of the Orient which has both lungs and gills when it is full-grown. The young tadpoles inhale and exhale by gills on the outside. In some species of the salamander, the tadpoles breed before reaching a mature stage, but this is very rare. There is also a breed which has snow white skin.

Salamis, an island off the coast of Attica. It lies due west of Athens. It is separated from the mainland by a long crooked, narrow strait. It was the scene of a celebrated naval battle. After a tempo-

1. Proteus. Europe. 2. Siren or mud-eel. Gulf States. 3. Congo snake. North America.
4. Salamander. Eastern United States. 5-6. Axolotl and young. Mexico.

SALAMANDERS.

rary delay at Thermopylae, Xerxes advanced on Athens and set the city on fire. The Athenians removed their women and children to a place of safety and went aboard the fleet that Themistocles had wisely persuaded them to construct. By the shrewdest kind of management he held his fleet and that of his allies together in the strait of Salamis until the Persians, with a mixed fleet from Asia Minor and half-hearted Greek states, had blocked both ends of the strait and rendered flight impossible. The battle took place September 20, 480 B. C. It should be understood that the ships of both contestants were propelled by long oars or sweeps working in oarlocks in the ship's sides. The sailors sat on benches under the deck, and bent to their oars in unison. The fighting men were on the deck above the rowers. Fighting was carried on by throwing out grappling hooks and catching the vessel of the enemy. As the vessels drew together a shower of javelins was let fly, and a hand to hand conflict ensued. Dead or alive, the conquered were cast into the sea.

Themistocles had chosen his location with judgment. Man for man and ship for ship his forces were superior in quality, and were fighting, moreover, in very desperation, for home, life, and family. The narrowness of the strait permitted the ships of Xerxes to come into action no faster than the Greeks were able to dispose of them. The sea was soon full of abandoned hulls and floating wreckage of all sorts. The athletic Greeks with shouts of victory darted hither and thither spearing clinging Persians, "as men spear tunnies." Terror, bred of disaster, spread through the vast Persian fleet. Hundreds of ships crowded into the narrow passage. They blocked each other's way, entangled their oars, and fell a helpless prey into the hands of the Athenians, the smoke of whose burning homes was not calculated to arouse sentiments of mercy. Nightfall stayed the slaughter. Expecting a victory, not a disaster, Xerxes had led his army to the coast of Attica that none who escaped the javelin and the sea might flee by land. He had caused his throne to be erected on a promontory overlooking the strait. After the battle he made all haste by land and sea for the Hellespont lest the Greek fleet cut off his retreat to Asia.

> A king sat on the rocky brow
> Which looks o'er sea-born Salamis;
> And ships by thousands lay below,
> And men in nations,—all were his,
> He counted them at break of day,
> And when the sun set, where were they?
>
> —Byron, *Childe Harold.*

Salary Grab, in American history, a popular name for a general increase in federal salaries. The Constitution provides for the payment of certain salaries from the national treasury. An act of March 3, 1873, duly signed by President Grant, provided that the president's salary should be increased from $25,000 to $50,000, that of the chief-justice from $8,500 to $10,500; and those of the vice president, cabinet, associate justices, and the speaker of the House from $8,000 to $10,000, and that of senators and representatives, from $5,000 to $7,500. An amendatory act passed on the following day provided that back salary be allowed to congressmen for two years. This last feature was condemned by every body and aroused so much indignation that the universal cry of "Salary Grab" was raised with such effect that the law was repealed except so far as it related to the salary of the president and justices.

Salem, Mass., a manufacturing city and one of the two county seats of Essex County, is 16 miles northeast of Boston, on the Boston & Maine Railroad, and on an arm of Massachusetts Bay. In Colonial times, this city was of more importance to a greater section of the country than it now is. It was founded in 1626 by Roger Conant, under the name of Naumkeag and was the second permanent settlement in the state. In 1629, the present name was adopted. Roger Williams removed to Salem from Plymouth in 1633 and began to preach freedom of thought and religious liberty; but persecution forced him to leave for a more peaceful place. In 1692, Salem attracted attention as the scene of the witchcraft delusion and its attendant persecutions, which lasted for about a year.

Until about 1860, Salem carried on an extensive and profitable trade with Europe, India, China and Africa; and from 1755 to 1880 there were important ship yards

here. Important among the many interesting buildings in Salem are the Essex Institute, The Peabody Academy of Science, Witch House, the House of the Seven Gables, and the house in which Nathaniel Hawthorne was born. The old custom house, in which Hawthorne worked as a surveyor of the port from 1845 to 1849, still stands.

Salem has a parked area of about 400 acres, including Gallows Hill, Forest River, Washington Square, Highland, and other parks. It has a state normal school, a high school and fine libraries. Manufactures include brass, copper and bronze products, boots, shoes, leather, cotton cloth, printed matter and machine shop and foundry products. The First Provincial Assembly of Massachusetts met in Salem in 1774 and declared the independence of the colony. Population in 1920, 42,515.

Salem, Oregon, the state capital and county seat of Marion County is 50 miles south of Portland on the paved Pacific Highway. It is served by the Southern Pacific and Oregon Electric railroads and stage service every hour to all parts of western Oregon.

Salem is in the Willamette Valley and is the center of the fruit and berry industry of the northwest. The city is surrounded by 27,000 acres planted in fruits and berries. Also by a vast fertile farming country especially adapted to dairying, due to its mild winters and cool summers.

With two exceptions all Oregon state institutions are located in Salem. Six miles north is the Salem Indian School, the largest school for Indian students in the United States. The city is also an educational center. For the public schools $500,000 was voted in May, 1923 and Willamette University, in the fall of 1922, received an additional endowment of $1,250,000, partly from the Rockefeller Foundation Fund.

Its manufactories include one of the largest paper mills in the northwest, a large saw mill, woolen mill and flour mills. But the chief industry of Salem is that of its eight fruit and berry packing plants, offering a steady market for the heavy tonnage of fruits and berries. From the Salem district of Oregon come the large Oregon cherries, loganberries, prunes and Bartlett pears. Pop., 1920, 17,679.

Saleratus. See SODA; BREAD.

Salic (săl′ĭk) **Law,** a code of laws originating with the Salian Franks, a tribe of Teutons. They lived along the lower Rhine. The code was compiled, it is thought, prior to the conversion of this people to Christianity. The oldest manuscripts, however, are in Latin, and date from the time of Clovis. The code is subdivided into sixty-five chapters. It throws no little light on the customs of the people among whom it originated. The provisions relate to lawsuits, fines, theft, kidnaping, injury to persons and animals, and the inheritance of property. The people lived evidently in villages. They cultivated fields and raised cattle, hunted, and fished. They had vineyards and gardens. They had workers in gold and iron. Serfs and slaves are mentioned, but nothing is said of an aristocracy. A noted clause, frequently referred to as the Salic Law, provides that women shall inherit personal property only, real estate going to male heirs. At some time, just when is not clear, the law was applied to the inheritance of the crown. In France, where the Salic Law prevails, no female has ever occupied the throne. If the Salic Law had prevailed in Great Britain, Mary, Elizabeth, Anne, and Victoria would have been excluded from the throne.

Salina, Kans., the county seat of Saline County, is 100 miles west of Topeka, on Smoky Hill River and on the Missouri Pacific, Atchison, Topeka & Santa Fe, Union Pacific and Chicago, Rock Island & Pacific railroads. Th chief manufactured products of the city are flour, rugs, mattresses, foundry products and wagons. Live stock and grain are the principal items of commerce.

Salina has a good system of public schools and is the seat of Kansas Wesleyan University and Saint John's Military School. The city has a Carnegie library, a Y. M. C. A., Saint Barnabas and Saint John's hospitals, a Federal building, and a forty-one-acre park. In 1920 the population was 15,058.

Salisbury, salz′bĕr-ĭ, **Robert Arthur Talbot Gascoyne, Marquis of** (1830-1903), an English statesman. He was born in Hatfield, Hertfordshire, and was educated at Eton and at Christ Church, Oxford. He represented Stamford in the Commons from 1854 to 1868. He was secretary of state for India in 1866, and again in 1874. In 1878 he accompanied Disraeli to Berlin as joint plenipotentiary of Great Britain, and sat in the Congress of Berlin. He became foreign secretary in 1885, also prime minister upon the resignation of Gladstone. Gladstone returned to power within a year, but before the end of 1886 Salisbury was restored to the premiership and remained in office until 1892 when the Conservative party met its defeat before the question of Irish home rule. Lord Salisbury was restored in 1885 and remained prime minister until 1902. He always maintained a strong opposition to the Liberal party and remained a loyal, consistent Tory.

Salisbury, Rollin D. (1858-1922), a geologist and educator, was born at Spring Prairie, Wis. He finished his education in Europe, chiefly at Heidelberg. He was instructor of geology and biology from 1883 to 1891 at Beloit College, Wis. Later, he was professor of geographic geology at the University of Wisconsin. He had been head of the department of geology of the University of Chicago since 1919. He was geologist in charge of the Pleistocene geology of New Jersey from 1891 to 1915. Mr. Salisbury was a fellow of the Geographical Society of America, the first president of the Geographic Society of Chicago, from 1898-1900, and held the same position again in 1910-1911, and in all the other years was a director. He was a notable investigator in the fields of geographic and biological science, yet it has been said that his great achievement was as one of the world's great teachers, and in the building of useful men.

Mr. Salisbury was the author of many books on the sciences in which he specialized, among which are *Landscape Geology; Modern Geography for High Schools* (with Harlan H. Barrows and Walter S. Tower); *Physiography* (1913); *College Text Book on Geology* (Thomas Chrowder Chamberlin, joint author, 1909); *Geology* (Thomas Chrowder Chamberlin, joint author, 1904-09), and he contributed many papers and studies to various scientific magazines.

Salisbury, sawlz′ber-ĭ, the county town of Wiltshire, England. It is situated at the confluence of four beautiful streams, eighty miles southeast of London. The city was formerly the seat of a considerable manufacture of woolens and cutlery, but it now depends chiefly on local trade with the surrounding agricultural district. The town is also known as New Sarum. The site of a former town lies in the immediate vicinity. Up to 1832 the land owners of Old Sarum had the right of sending two members to Parliament, although there was not an inhabited building in the borough. The neighborhood is remarkably rich in antiquities. The Blackmore Museum of Salisbury contains one of the most extensive and best arranged collections of prehistoric implements and remains to be found in England. Salisbury is noted chiefly, however, for its cathedral. It has the form of a Greek cross. A central spire, celebrated for its lightness, slender proportions, and beauty, rises to a height of 404 feet, the tallest in England. The spire was completed in 1375. It is two feet out of perpendicular.

Saliva, the fluid of the mouth, sometimes called spittle. In man there are three salivary glands on each side of the head. They discharge their contents through ducts into the mouth during the process of chewing. The largest, from two to three inches in length, lies in front of the ear and discharges its saliva into the mouth just above the second upper premolar tooth. Saliva moistens dry food so as to render the process of swallowing easy. It also begins the process of digestion. After a moment of chewing, a mouthful of dry bread acquires a slightly sweetish taste. This is due to the action of saliva which changes some of the starch into sugar, one of the first steps in digestion. For this reason physicians recommend that food be chewed well. Most mammals have salivary glands, but they are absent in the whale. Most reptiles, except the crocodile, are furnished with saliva, with which they cover their food copiously before swallowing

Sallust (86-34 B. C.), a Roman historian in the time of Caesar. Sallust was a member of the Senate and held a number of important positions under Caesar. As proconsul, he accumulated a large fortune in Africa. At Caesar's death, he retired to private life in a beautiful villa and devoted himself to historical study. Sallust appears to have written a history of some pretension, taking Thucydides for his literary model, but, save a few fragments, the work has been lost. Two short histories, *The Iugurtha* and *Catiline's Conspiracy,* are his present claim to notice. In point of time he preceded Livy and, in fact, all other Roman historians save Caesar. See CATILINE.

Salmon, săm′ŭn, a large family of fishes, including the trout. The salmon of literature, the "King" of learned Izaak Walton, is from two to four feet long and weighs from five to twenty-five pounds. A single fish has been known to weigh eighty-three pounds. It is bluish-black above and silvery below,—a noble fish in all respects, brilliant in color, perfect in form, and matchless in courage. It is an inhabitant of the deep sea ascending suitable Atlantic rivers from New York to France northward to spawn. No water is too far from the sea if there is a way to it. Salmon are famous for leaping falls, going over a ten foot dam with ease and ascending waterfalls to a much greater height. They seek a gravelly, clear, cool shallow, as remote from the ocean as possible, where they plow slight furrows in the sand working two and two. The male and female shed their spawn into the same furrow for several days in succession; then they make their way down stream by easy stages to the deep sea again. They gather in the estuaries of our rivers in early spring floating up and down with the tide. At this season they are taken with nets and sent to market on ice. In July they begin the ascent of our American rivers (later in Europe), and are gone several weeks. After their return, they stay in brackish water for a while and then retire to the deep sea for winter.

The Ouananiche (win-nan-nish′), the land-locked salmon of the Saguenay River and other Quebec waters, is of a beautiful peacock blue when taken from the water. Like the ocean salmon, it rises to a fly. It weighs up to four pounds and is a tremendous fighter. When hooked, it leaps several times from three to twelve feet high. Stout tackle and skill are required to land the Ouananiche. Another fresh water fish is the Sebago salmon found in Sebago Lake and other Maine waters. It attains an extreme weight of fifteen pounds. The Atlantic salmon is capable of swimming twenty miles an hour. By attaching numbered metal tags to salmon and releasing the fishes, the Board of Scotland has found that salmon return to the same spawning ground, season after season, like birds to their nests.

The salmon of the Pacific require a special account. Between Sacramento and Kamchatka there are five species. Named in order of food value, they are the Quinnat or Chinook, the blueback or sockeye, the silver or Coho, the humpback, and the dog salmon. They dwell in the Pacific leading an unknown life. After they have reached maturity the early spring finds them desirous to spawn. They begin the ascent of rivers and streams in search of cool, fresh water. If the head of the stream be warmer than 54°, the salmon wait for the temperature to fall. They ascend the Yukon and Columbia rivers for a distance of 1,000 miles. As soon as they leave salt water they cease to eat; possibly fresh water food does not agree with them. They begin to lose fat, the flesh fades from salmon color to white, the skin thickens, the scales sink slowly out of sight in the skin, the digestive organs shrivel up for want of use, the body becomes slabsided and thin. Having spawned, both male and female become covered with blotches of fungus and float idly away. Whether spawning takes place near the sea or a thousand miles away from it, this is the last act of the salmon's life. Not an adult salmon ever returns to the Pacific. This is true of all Pacific species.

Actual spawning lasts from August to October according to distance from the sea. The eggs hatch in fifty days. The young fry are provided with egg sacs from which they absorb nourishment for sixty days. They stay that length of time on the spawning grounds. They then begin to feed on fresh water food like minnows, and float leisurely toward the sea—a trip it may be

of months, or a year. When they reach salt water they are four or five inches long.

When spring salmon enter the rivers from the ocean, fat, plump, and tender, they furnish food for man, bird, and beast. Salmon fresh and salmon smoked and dried form a large part of the food of the Chinook and other Pacific Indians. Fishing birds gorge themselves till they are almost too heavy to fly. Even ducks and teal come in for a share, and the bears of Alaska grow big and fat on the salmon they have caught "with the hooks that Nature gave them."

In their hurry to reach spawning grounds the salmon not infrequently crowd upon each other at narrows or other obstructions in such masses as to force a ridge of thousands of flapping salmon above the water. At such places twenty and fifty pound fellows may be thrown from the water with a pitchfork. Enormous numbers are taken at this season for canning. Long seines are drawn through the water, resulting sometimes in incredible hauls. Writers with opportunity to know state that 10,000 blueback salmon are not an unusual haul. Schools of 25,000 and 50,000 have been swept ashore. One writer asserts that 100,000, a tenth of a million, of five-pound blueback salmon were imprisoned by a seine in the Yukon in 1896. Sixty thousand were used and the rest liberated. Another means of taking salmon is the fish wheel. A large wheel like the stern wheel of a steamboat is provided with nets instead of paddle blades. The wheel is fixed in the stream where the salmon are running. The current of the river turns the wheel. The salmon are scooped up by the paddle nets and drop into a chute at the center of the wheel, thence into a fishbox set to receive them. One wheel in the Columbia has been known to take eighty-four tons a day, but by far the largest number are caught in traps or pounds which consist of a series of nets so laid and fastened to stakes on the bed of the river or bay that they lead the fish into a trap from which they cannot escape. The traps are used almost exclusively in the Alaskan fisheries.

Salmon packing has become one of the most important industries on the Pacific coast, and during the season it furnishes employment to over 20,000 people. The fish are cleaned, dressed and cut into pieces, which are placed in cans and thoroughly cooked by steam before the cans are closed. In small canneries the work is done by hand, but in the large canneries it is done by machinery. The wasteful practices, common in the early history of the industry, have given place to scientific methods and there seems to be little or no danger of diminishing the yearly supply of this excellent food fish.

In 1918 the salmon packed on the Pacific coast of North America amounted to 9,692,300 cases, distributed as follows: Alaska, 6,677,567 cases; British Columbia, 1,616,157; Puget Sound, 624,198; Columbia River, 591,381. The value of the Alaska pack was $51.041,949. This is more than four times the value of the gold mined in the territory for the same year.

See FISH.

Salon, in art, an annual exhibit at Paris of modern painting and sculpture. The name, salon, is derived from the gallery of the Louvre in which exhibitions were held formerly. The exhibit is now held in the handsome Palace of Industry, a rectangular building 810 feet long, 354 feet wide, and 114 feet high, erected on the south side of the Champs-Elysées for the first great Paris exposition of 1855. Paintings are shown on the ground floor; sculpture on the floor above. Exhibits must be accepted by proper committees before they are given place. Prizes are awarded. It is considered an honor to be granted the privilege of exhibiting, and a still greater honor to win a prize. The exhibit is held from May 1st to June 20th. The public is admitted daily for a forenoon fee of forty cents and an afternoon fee of twenty cents, with two afternoons a week free. The higher price of admission for the morning hours is designed to moderate the size of the crowd and give artists a chance to study to better advantage.

Saloniki, sä-lō-nē′kē, or **Salonica,** a seaport of former Turkey in Europe. It is situated on the Gulf of Saloniki three hundred fifteen miles southwest of Constantinople. It was rebuilt on the site of Therma by Cassander in 316 B. C., and was named Thessalonica after the wife of Cassander, a sister of Alexander the Great. This is the Christian Thessalonica where St. Paul

Drawing in the Net

Unloading the Fish

In the Cannery

Ready for Market

SALMON INDUSTRY

preached and to whose inhabitants he addressed his epistles, I and II Thessalonians. The present city rises from the sea in triangular, picturesque form, and the surrounding cypresses, the oriental architecture, the mingling of antiquities and modern trade and transportation conveniences add much to the striking bird's-eye view of the place. Here is found the ancient acropolis, known as the Citadel, containing a triumphal arch from the time of Marcus Aurelius. Other characteristic architecture is represented in the mosques of Saint Sophia, Saint Demetrius, and Saint George, and the famous triumphal arch of Constantine. Next to Constantinople, Saloniki is the chief port connecting the commerce of Europe with that of former European Turkey. It is a railroad center, the terminus of a trans-European railway. Its chief manufactures are cotton, silk, Morocco leather, flour, soap, and brick. It exports grain, wool, tobacco, opium, wine, and timber. Premier Venizelos made the city the capital of his provisional government in 1917, but this government was later merged with the regularly constituted government. Population, 170,193.

Salsify, a plant of the composite family. It has grass-like leaves and a single showy head of purple florets. It is related to the dandelion and is cultivated extensively as a vegetable. It has a long parsnip-shaped root, much used for the table. Its flavor has given it the name of oyster plant, or vegetable oyster. The salsify is a native of southern Europe. See VEGETABLES.

Salt, a well known crystalline substance. Chemically, it is a compound of chlorine and sodium, an atom of each. It is one of the most widely distributed, most important, substances in nature. Pure salt is colorless. Its specific gravity is 2.2. It crystallizes in cubes. Salt forms three per cent or sixty pounds to the ton of ordinary sea water. Immense deposits, laid down, no doubt, by former seas, occur like coal measures. In this form it is called rock salt. The most remarkable deposit of rock salt is worked near the city of Cracow in Austrian Poland. There are mines also in India and in Germany. Rock salt is found in Virginia and in Louisiana.

The American supply of salt is obtained chiefly by evaporating brine. Sea water confined in reservoirs and allowed to evaporate under the heat of the sun yields immense quantities of salt. This method is pursued on the Pacific coast and on the shore of Great Salt Lake. There are extensive salt works at Alvarado, twenty miles from San Francisco. They are protected by a system of dikes. Sea water is admitted as desired. The brine is moved by means of windmills. When a reservoir has been dried out thoroughly, the salt is plowed and scraped up into heaps by horse graders, and is loaded on cars by steam shovels.

The waters of salt springs, coming, no doubt, from beds of rock salt, occur in several states. The brine is obtained by boring and pumping. Evaporation by solar heat is too slow and the brine is boiled down by steam heat. In 1918 New York State produced over 11,000,000 barrels of salt, and Michigan over 10,000,000 barrels. Ohio and Kansas produced over 3,000,000 barrels each. California, Louisiana and the Province of Ontario, Canada, also produce large quantities. The Louisiana deposit is on Avery's Island, near New Iberia. It covers 144 acres and the salt has a high degree of purity. Large quantities of salt are obtained from Great Salt Lake, Utah, and there are extensive deposits in Nevada.

In 1921 the discovery of the largest deposit of salt in America was made known by the United States Geological Survey. It extends from eastern Oklahoma across Texas into New Mexico. The area is 100,000 square miles.

In France, Germany, and India table salt pays a special government tax like that collected on cigars and tobacco in this country. In Italy, Austria, and China the government monopolizes the business of making and selling salt.

Salt appears to be one of the necessities of life. Many plants cannot grow except in a salty soil. Horses, cattle, sheep, and all wild animals of the deer and antelope kind require salt. They suffer if without it. They obtain a partial supply in vegetable food. Salt licks, that is to say, briny springs or salty land the world over are frequented by hoofed wild animals. Even timid deer will encounter almost any danger to get

a lick of salt. The salt licks of Kentucky are surrounded by the bones of countless generations of buffalo and deer, showing that they were visited for centuries. Animals of the dog and cat tribes, living largely on flesh, seem indifferent to salt.

Even the rudest people desire salt. Mungo Park states that the interior chieftains of Africa were willing to sell their wives and children for small amounts of salt. In one tribe the expression, "he eats salt," is equivalent to saying that a man is rich. We learn that the Germanic tribes fought for the possession of the salt wells at Halle and elsewhere. About 1810 a mine of rock salt was found on the island of Petite Anse in Louisiana. On exploration, aboriginal tools were found, showing that the mine had been worked by prehistoric man.

Bacteria cannot live in a solution of salt. Salt was used to cure meats and to put down pickles long before any one knew that putrefaction was due to microscopic plants or germs. The picture of a putrid sea drawn by Coleridge in the *Ancient Mariner,*

> The very deep did rot; O Christ!
> That ever this could be!
> Yea, slimy things did crawl with legs
> Upon the slimy sea,

would soon become true, were it not for the anti-bacterial—the preservative—quality of salt.

Butter and cheese are salted not only to suit the taste, but to preserve them. Hides are salted for the same purpose. Wood may be salted to prevent decay. Salt is used in the manufacture of glass, in the preparation of a bleaching mixture, in the manufacture of soap, and the smelting of silver. A sprinkling of salt increases the fertility of worn out land. Alkali lands have too much salt.

Salt has received mention in literature. Homer calls it divine. Following the analogy that wit seasons conversation as salt seasons cookery, it is called "Attic salt." When Ben Jonson says, "I have no salt," he means that his wit fails him. To take a statement with "a grain of salt" is to make allowance for exaggeration. An "old salt" is one who has followed a seafaring life. Salt was given a prominent place midway down the table in the old English dining hall. Menials and those of low degree sat below the salt. To sit "above the salt" was a mark of social distinction. Salt is an emblem of hospitality. The Arab will not treat as an enemy one who has eaten salt at his table. See CRACOW.

Salt Lake City, Utah, the metropolis of the state and the county seat of Salt Lake County, is situated 12 miles southeast of Great Salt Lake, on the Oregon Short Line, Denver & Rio Grande, Los Angeles & Salt Lake and Western Pacific railroads. It is 920 miles northeast of San Francisco and 676 miles west by north of Denver. The environs of the city are rich in scenic beauty, and the city itself is one of the cleanest and most attractive in the United States.

DESCRIPTION. Salt Lake City occupies about 50 square miles. Almost in the exact center of the city, in Temple Square, stand the famous Mormon Temple, Tabernacle and Assembly Hall. These are undoubtedly the most attractive buildings, but mention must also be made of Amelia House, Lion House, Deseret Hospital and Zion's Cooperative Mercantile Institution, all closely associated with Mormon history (see MORMONS; UTAH, subtitle *History*).

Salt Lake City has a large parked area, the most important parks being Liberty, Pioneer, Wandamere and Majestic. The city and county buildings, Federal building, Union Station, Saint Mary's Cathedral, and Saint Mark's and Holy Cross hospitals are noteworthy structures.

INSTITUTIONS. The public school system is entirely modern, and Salt Lake City is the seat of the University of Utah, Latter Day Saints' University, Gordon Academy, Rowland Hall, All Hallow College, Salt Lake Collegiate Institute and a state normal school. The state penitentiary is also located here.

INDUSTRY AND COMMERCE. Salt Lake City is the most important trade center between Denver and San Francisco, and its interests are primarily commercial. Live stock, fruit and cereals are important items of the extensive trade. The principal industrial establishments are smelters, woolen mills, iron works, marble works, beet sugar

factories and factories for the production of soap, shoes, cereal foods, harness and saddlery and tobacco products.

History. In the year 1847 Brigham Young and his followers arrived at the site of the present city, which was organized in 1851. Though originally an exclusively Mormon settlement, hardly one-half of the 118,110 citizens now belong to that sect.

Salton Sea, a temporary body of water in southern California. Ages ago the Gulf of California extended 150 miles farther northwestward than it does now. The Colorado River, busy carving the Grand Cañon, deposited its fine silt on the east side of this arm and built a delta out into the gulf so far that it finally constructed a dam clear across and cut off the upper end of the gulf entirely. The waters of the Colorado found their way southward, leaving the northern or upper end to dry out. The climate being hot and nearly rainless, the water evaporated, leaving a depression called Salton Sink. The dry bottom of the old gulf is 285 feet below the level of the sea and consequently more than that below the current of the Colorado River. This explanation of the origin of the Sink is the more credible when we learn that the Colorado still carries enough silt to cover fifty-three square miles of land a foot deep with alluvial soil yearly. The Colorado is subject to a thirty foot rise when the snows melt in the mountains. Ever since the region has been known, the river has had times of discharging surplus water by a couple of old dry channels, the New and the Alamo, into Salton Sink, creating a swamp that soon dried out again.

In 1891 a project was formed to draw water from the Colorado River and irrigate at least a portion of the Sink. The land proved so productive that settlers moved in, towns were built, and two new canals were cut, leading from the Colorado. The soil is so fine and so easily washed out that in 1905 one of the canals began to scour rapidly, and the entire Colorado turned down the northern side of its old delta into Salton Sink.

The entire Sink is so large and so deep that it is believed the river would require fifty years to fill it. Indeed, it is doubtful whether the enormous supply of water would in the end more than balance the great loss by evaporation, but the property interests of the Sink were too valuable to permit trying the interesting experiment. If the Sink were to fill, 150 miles of railroad tracks, 400 square miles of irrigated lands, with their orchards and fields of alfalfa, and the homes of 20,000 people would be submerged or rendered useless. Taking into consideration 700,000 acres of rich land awaiting irrigation, it is not too much to say that the Colorado threatened to destroy $400,000,000 worth of property. There was hurried and desperate work. Dams were built, but high water undermined and carried them away. In 1906 the Southern Pacific Railway and the United States engineers tackled the problem systematically. A spur railway was built across the new channel. Long piles were driven across the stream. There being no foundation but silt that melts away almost like sugar, brush mats 100 feet long were pinned to the bottom of the channel with piling. An army of workmen was assembled. Trainloads of dump cars loaded with stone from several miles away were run out on the trestle to drop their contents in the stream. For months train followed train. Every now and then the waters got under or around the growing dam and washed out sections of it; but gradually skill prevailed. The sullen waters began to rise on the upper side of the dam. The dam held. The Colorado returned gradually to the old course to the Gulf of California, and in February, 1907, the engineers were able to announce that the Salton people were safe and once more engineering skill had triumphed.

The streams running northward from the Colorado into the Sink cut the dry valleys into deep gorges that ruined irrigation projects and left the settlers high and dry in torrid heat without water for their farms and orchards. Many homes were washed away; thousands of people lost their all. In the meantime, the swamp at the bottom of the Sink had been enlarged into a sea or inland lake forty-five miles long, fifteen miles wide, and eighty feet deep. A season of unusual rainfall en-

sued, due, it was claimed by some, to the influence of the new body of water. Mr. Henry of the United States Weather Bureau has pointed out, however, that the sea contains about 2.2 cubic miles of water, enough to cover the area in question with somewhat over an inch of water, a very ordinary shower, while rainfall for the year under discussion amounted to the very unusual depth for that region of over twenty-six inches.

The United States Weather Bureau has taken steps to study the effect of evaporation. Theoretically, the sea should sink about eight feet a year, but for the first few years it dried up less rapidly than expected, the annual fall being about five feet. After that the evaporation was more rapid but a lake nearly 40 miles long and from 10 to 15 miles wide remains. Millions of dollars worth of property were destroyed, and it was several years before some of the flooded land was used. The Grand Cañon, the Colorado River, the creation of the delta, the recession of the gulf, the irrigation projects, and the making of Salton Sea form an intensely interesting chapter in geography.

Saltpeter, a compound of nitric acid and potassium, known as potassium or potassic nitrate. It is obtained for sale in considerable quantities in the caverns of Kentucky and Tennessee, where it occurs as an incrustation. Saltpeter is found also in India, Persia, Egypt, and Spain. Of late it is obtained in commercial quantities from so-called saltpeter deposits in Chile, Peru, Bolivia, Nevada, and California. The saltpeter deposits of Chile yield $27,000,000 worth annually. Saltpeter is used in dyeing clothing, melting metals, medicines, curing meats, and especially in the manufacture of gunpowder. See GUNPOWDER.

Salts, a group of chemical compounds, usually resulting from the union of an acid and a base, though the direct union of a metal and a non-metal may occur resulting in a salt. The best-known illustration of this class is common or table salt. If hydrochloric acid and sodium hydroxide, a basic compound, interact, the metal sodium takes the place of the hydrogen of the acid, thus producing salt. The residue is water. This is a simple case. Potassium from caustic potash may replace the hydrogen of nitric acid and produce saltpeter, a salt. If the hydrogen is not all replaced, an acid salt results. If there is more of the basic radical than of hydrogen in the acid originally, the salt is basic. Sometimes two metals may replace the hydrogen, which gives rise to a double salt.

Salvador, a republic of Central America, is on the Pacific Ocean, and is bounded on the northeast by Honduras and on the northwest by Guatemala. It has a coast line of about 160 miles and extends inland for an average of 60 miles. The area of Salvador is 13,183 square miles, and on January 1, 1922, the inhabitants were estimated to number 1,501,000.

The coast is a low, alluvial plain, hot, damp and prolific; this plain has an average width of 15 miles. For the rest the country is a rugged plateau with a mean elevation of 2,000 feet, but dotted with volcanic cones that rise above this height. Earthquakes, such as the one that rocked the city of San Salvador in 1919, frequently occur.

The most important river of the republic is the Lempa, and the most bountiful agricultural lands are in the valley of this stream. Of first importance is the coffee crop, and in 1920 there were approximately 100,000,000 coffee trees. Cacao, rubber, sugar cane and tobacco are grown, and the forests yield mahogany, balsam, cedar, walnut and dye woods. Horses, cattle, sheep and swine are raised, cattle being numerically the most important. In recent years the cultivation of indigo, hemp and bananas has occupied many people. Salvador produced 60,000,000 pounds of coffee and 40,000,000 pounds of sugar in 1921. Sugar refineries, distilleries, saw mills, coffee cleaning plants and cordage mills are the leading manufacturing establishments.

The republic has about 1,800 miles of good highways and about the same length of unimproved roads. Railway transportation is afforded by 213 miles of narrow gauge line. There are 165 post offices, three wireless stations, 2,400 miles of telegraph lines and 1,400 miles of telephone lines.

Central America was conquered in 1524 by Pedro de Alvarado. No independence was enjoyed by the Central Americans until, in 1821, Mexico threw off the Spanish yoke and the Central American countries gained freedom at the same time. In 1824 Salvador adopted a constitution, which has been amended several times. This provides for a President elected for four years and a Congress of Deputies, numbering 42. The state religion of Salvador is Roman Catholocism and the official language is Spanish. The capital and metropolis, San Salvador, had 80,756 inhabitants at the last census.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	13,183
Population (estimated 1922)	1,501,000
Indians	234,648
Chief Cities:	
San Salvador	80,756
Santa Ana	60,679
San Miguel	30,406
San Vincente	26,881
Nueva San Salvador	23,291
Number of departments	14
Members of Congress	42
National revenue	$5,000,000
Bonded indebtedness	$15,000,000
Coffee, pounds annually	70,500,000
Domestic Animals:	
Horses	74,336
Cattle	284,013
Sheep	21,457
Swine	422,980
Imports	$5,000,000
Exports	$10,000,000
Miles of railway	213
Teachers in public schools	1,613
Pupils enrolled	51,305

Salvation Army, The, a religious body organized on military lines which had its origin in England. Its object was the hope to reach those who were not church goers. Its founder was the Rev. William Booth, and its history is interwoven with his life work and that of his wife, Catherine Booth. William Booth was born in England, where he became a minister of the Methodist Church and a noted evangelist, his powerful sermons attracting enormous crowds of people. He came to the conclusion that the masses of non-church goers could not be reached through the ordinary methods of the churches, so, resigning his pastorate, he began missionary open-air work in connection with the established churches. The mission conducted was reorganized in 1878 and modeled along the lines of a military force.

In its early days the Salvation Army met with much opposition, and even ridicule and persecution, and in order to vindicate their right to preach and sing in the streets, many of its officers went to prison. In 1890, General Booth, in his work *Darkest England and The Way Out,* outlined a plan of rescue work, and large sums were contributed towards it.

The two watchwords of the Salvation Army are "free salvation for all" and "holiness." In its central organization the government is autocratic, but democratic in its divers activities. General Bramwell Booth succeeded his father in 1912, and he directs all the movements of the organization. These include women's social and rescue work; the furtherance of Christianity among sailors and soldiers; emigration; the finding of missing friends and relatives, etc. Other benevolent features are midnight rescue brigades for the sick poor; assistance to discharged prisoners; and visiting prisoners. Through the efforts of the Army, hundreds of drunkards and derelicts have been reclaimed and led on the path of usefulness. There are stations and settlements in all the large cities.

The Salvation Army in America is a branch of the original English organization, and was established by Commissioner George Railton and seven women officers in 1880. Later, the American work was in charge of Evangeline Cory Booth, the daughter of William Booth. This was entered upon in 1904. Under her leadership the Salvation Army in America grew by leaps and bounds, and not only its charitable work, but its assets, increased tremendously. She was recalled to England in 1922. Open-air services constitute one of the main features of the work. Meetings held evenings and Sundays are attended by people who are not affiliated with any particular church, and also by others passing by. Camp meetings are held in summer.

The work in the United States is divided into two branches, with national headquarters in New York City. The department of the West has its headquarters in

Chicago. There were in 1923, 115 industrial homes; 85 workingmen's hotels; and 26 rescue and maternity homes, where a large number of women and children are sheltered, meals supplied and beds furnished. An employment bureau is a part of the work; needy mothers and children are given summer outings; ice is distributed during the warm months; coal is furnished; and Christmas and Thanksgiving dinners are provided for the poor.

During the World War the Salvation Army was one of the chief instruments for the amelioration of the conditions of the soldiers, and was duly accredited as such by the United States government. Its great work during the war is well nigh impossible to estimate fully. Back of the battle areas the well-planned work and kindly offices for relief were incessantly carried on; also in huts, hospitals, rest rooms, and wherever the workers saw they could give aid. The same great work was carried on in England by the officers of the army there. Relief work was carried on in all the larger cities in both countries. Huts were erected immediately outside of the encampments, the Salvation Army furnishing a great number of workers. Ambulance brigades were established, strangers' bureaus organized and recruiting offices maintained.

Salvini, sȧl-vē′nē, **Tomasso** (1829-1896), an Italian actor. He was born in Milan, was trained by Modena, and began his stage career when he was sixteen. He became a member of the Ristori troupe in 1850, after having spent a year of active service in the war of Italian independence. He made successful tours through Italy, France, Spain, England, Germany and America. He devoted himself to tragedy and won fame for his presentations of Hamlet, Othello, Oedipus, Orosmane, and Alfieri's Saul. He retired from the stage in 1891 when he went to live in his villa near Florence. His skillful acting made him one of the most prominent of modern actors.

Samaritans, a colony of Babylonians planted in Palestine by Sargon 722 B. C. The country of Samaria lay north of Judea and south of Galilee. The colonists brought with them some Babylonian religious ideas akin to those held by the Israelites whose homes they were sent to possess. The men of Judah sent missionaries among them. The Samaritans never fused with the Jews, however. Christ speaks of the women of Samaria as though they were foreigners. They founded a sanctuary of their own on Mount Gerizim. Shechem, now the Turkish town of Nabulus at the foot of the mountain, was their first town. A few Samaritans, possibly half a hundred families, still linger in a quarter of the old city of Shechem. They hold to the idea of one and one only true God. They still make three pilgrimages a year to Mount Gerizim to celebrate the principal festivals of their religion. They accepted in complete form the Five Books of Moses—Genesis, Exodus, Leviticus, Numbers and Deuteronomy —but rejected all the other sections of the Bible.

Samarkand, säm-ar-känd′, a fortified city of Russian Turkestan. It is situated in a fertile region midway from Bokhara to Tashkent at the foot of a western spur of the Thian-Shan Mountains. Though a mere name in the mind of the casual reader, Samarkand is a city of historical and commercial importance. It was early an important center of the Asiatic caravan trade. When taken by Alexander the Great its walls were over ten miles in circumference. From 711 to 1219 the city was occupied by the Arabs who made it a brilliant center of Moslem civilization. Its schools and wise men were known widely.

The city was taken by Genghis Khan in 1219. Later the inhabitants are said to have been overwhelmed by an army of 110,000 men under the conqueror Tamerlane, who made Samarkand his capital and adorned it with magnificent buildings, many of which still remain. The city was for a time under Chinese dominion, but reverted again to the Moslems, who regard it as one of their holy cities. The colleges of their university, as we may call it, occupied three sides of a public square and are still standing. They contain a large number of lodging rooms, now occupied by people of low estate. The front elevations or façades, as they are called, contain enormous gate-

ways and are ornamented with columns, archways, and towers. Within each college building is a spacious court decorated with enameled bricks of green, pink, gold, and turquoise blue wrought into exquisite designs. These courts are roofed by lofty bulb-shaped domes. A citadel, one of the strongest places in central Asia, occupies a space of four square miles. The most interesting feature of the present city is its large bazaars, commended by merchants for cleanliness and good order. As of old, the bazaars are the center of a brisk caravan trade. Wheat, rice, silk and cotton, fruits, cutlery, horses, harness, tapestry, tallow, soap, leather, and pottery are exported.

A chapel crowned with an elegant dome marks the burial place of Tamerlane. The interior is paved with white marble. The walls are covered with elegant turquoise arabesques and inscriptions in gold. The body rests in a crypt above which has been placed a large pyramidal piece of jade.

The city fell into the hands of the Russians in 1868. The city is surrounded by ruins. Heaps of enameled brick and stucco extend for miles in almost every direction. The present population is about 60,000.

Samoa, sä-mō′ä, or **Samoan Islands,** a group of volcanic islands in the South Pacific Ocean, known formerly as the Navigator Islands. They are about 2,000 miles south of Hawaii, somewhat over 4,000 miles southwest from San Francisco. The group was discovered by white men in 1721. It was named by the French in 1768. The first examination of the islands which might be called a survey was made by Commodore Wilkes of the United States navy in 1839. The Samoans are a people of Malay origin. They are a bright, active, alert race with light step and graceful person. The men possess great strength. The inhabitants have been converted to Christianity. In 1899, owing to quarrels between rival chieftains, Great Britain, Germany, and the United States, the nations having commercial interests at stake, agreed by treaty to divide the group along the line of longitude 171 degrees west of Greenwich; the United States took the islands east of that line; Germany, those lying on the west. The Peace Conference awarded Great Britain the German possessions

The total population of the islands is about 40,000, 1,000 being Europeans. Pango-Pango, well adapted to the purposes of a naval station, is the chief harbor of the Americans. Apia was the German harbor. German Samoa is now under Australian mandate. The chief exports are cotton, sugar, coffee, and cocoanuts. The dried kernels of the cocoanut are exported as copra. The houses are oval in shape, and are built of the wood of the breadfruit tree. A thatch of sugarcane or palm leaves protects the inhabitants from rain. The climate is delightful, especially for people of feeble health. The Samoans are a light-hearted race. They spend a great part of their time in dancing, feasting, singing, and going to church. Robert Louis Stevenson, it may be remembered, died on one of the Samoan Islands in 1894.

Sampson, Admiral. See SPANISH-AMERICAN WAR.

Samson, a judge of Israel, the strong man of the Bible. His story is told in Judges xiii-xvi. Before his birth, the story runs, an angel of the Lord appeared to his mother, saying that she should have a son who would "begin to save Israel out of the hands of the Philistines," and commanding her that "no razor should come upon his head." In that command lay the secret of his mighty strength, which forsook him not until he disobeyed the Lord and betrayed his secret to Delilah. Samson's first encounter with the Philistines was at the feast in celebration of his marriage to a Philistine woman. During his courting Samson had made several journeys to the country of the Philistines. On one of these he had met a lion, and killed it with his bare hands. A while later he turned aside to look at the body of his enemy—"and behold there was a swarm of bees in the body of the lion, and honey." At the feast Samson laid a wager with thirty young Philistines. If they could guess his riddle he would give them "thirty linen garments and thirty changes of raiment," if not, they were to give him the same. The riddle was:

"Out of the eater came forth food,
And out of the strong came forth sweetness."

The young men were nonplussed, and finally forced Samson's wife to entice the

answer from him, on threat of burning her and her father's house. So enraged was Samson that he went and killed thirty other Philistines, and gave the spoil to his guests. Then he went home leaving his wife at her father's house. When he came after a while to claim her, she had been given to another. Then Samson caught the three hundred foxes and with them burnt the Philistines' grain. The Philistines came and burned Samson's wife and her father; Samson retaliated and smote them "hip and thigh with a great slaughter." Samson's countrymen, fearing the wrath of their masters, the Philistines, delivered Samson bound unto them. But Samson broke his bonds, and with the jawbone of an ass slew "heaps upon heaps." The next of Samson's exploits is the carrying off of the gates of Gaza, followed by his downfall at the hands of Delilah. Though Samson had made many mistakes, not until he disobeyed God did "Jehovah depart from him." The story of his blinding follows—of his being called to make merry for the Philistines, and of his pulling down the pillars of the temple so that "the dead he slew at his death were more than he slew in his life."

Samuel, the last judge of Israel preceding the time of the Kings, and a prophet. His Hebrew name means "asked of God"; his mother, Hannah, had had no children before him. She had besought God to send her a son; Samuel was born. Hannah had promised God that if He sent her a son, the boy should be dedicated to God's service. So when Samuel was but a little child, Hannah took him to the temple at Shiloh and gave him into the charge of the high priest, Eli. There he helped in the temple services, wearing a little robe which his mother made for him each year, and a little ephod. But he had come upon a gloomy time for Israel; Eli was an old man, and the temple worship was in charge of his sons, who were wicked men. Religion was only a form and wicked things were done in the temple. One night Samuel heard the voice of God, telling him to go to Eli and tell him of the great wickedness of his sons—that because Eli had permitted it his sons and his house should be destroyed forever. It was a hard thing for Samuel to do. It might mean the loss of his position coupled with great disgrace. But he told Eli bravely, and the old man said, "It is Jehovah; let Him do what seemeth Him good." Samuel grew up to be judge of Israel. As such he restored the neglected worship of the temple, built new altars and schools of the prophets, and altogether ruled justly and wisely. He led his people in a great battle against the Philistines; the old enemies of the Israelites were beaten and put to flight. But when Samuel came to be an old man, his sons ruled Israel, and like those of Eli, did very wicked things. So the people begged Samuel to give them a king. Samuel was unwilling for he prophesied that great trouble would come upon Israel if he did so. The people insisted, however, and Samuel yielded and anointed Saul, retaining his place as judge of matters moral and religious. After a time Saul refused to listen to the counsel of the Lord as told by Samuel, and Samuel was commanded to anoint David king. He sought out the shepherd boy and poured the oil upon his head as God commanded, but he did not live to see the end of the struggle between David and Saul which followed. He died at Ramah, having been a "judge of Israel all his days"; and "all Israel gathered themselves together and lamented him."

Samurai, sä′mo͝o-rī, a feudal military caste of Japan. The samurai were the retainers of the daimios, and in 1871 they represented about one-sixteenth of the total population. With the abolition of the feudal system in that year, the daimios were joined to the nobility and the samurai were absorbed into the gentry class and were given the name shizoki. The class as a whole characterized by courage, patriotism, and loyalty, disappeared, but not until after repeated attempts at rebellion. Saigo of Satsuma took a firm stand against this drastic social change, but the civil war of 1877 only brought the efforts of the samurai to a total defeat, and the privilege of bearing arms and serving in the navy was extended to others than the descendants of these military retainers alone.

San Antonio, Texas, the metropolis of the state, is also the oldest city and the county seat of Bexar County. It is situated on the San Antonio River, 80 miles south by west of Austin, and is served by

the International & Great Northern, Southern Pacific, San Antonio & Aransas Pass, Missouri, Kansas & Texas, Gulf Shore and San Antonio, and other railroads.

DESCRIPTION. The city is built on both sides of the curving river, which is spanned by eighteen bridges. The streets are broad and well paved and are lined with handsome business buildings and residences. Brackenridge Park is very attractive and contains a zoological garden and a bathing beath. In San Pedro Park, in the center of city, are a number of mineral springs, and the park is said to have been the site of an Indian village that the white man's settlement replaced. The city has installed a $20,000 bathing beach at San Pedro Springs Park.

The best known structure in the city and one of the best known in the United States is the Alamo (which see). San Fernando Cathedral, the ruins of four Franciscan missions, a $1,000,000 Scottish Rites Cathedral, the Federal building, Carnegie library, city hall and post office are also noteworthy structures. Near San Antonio are Fort Sam Houston, the second largest military post in the United States, Kelly Field, largest aviation field in the United States, Camp Narmoyle, government auto repair shops, Brooks Field and Camp Stanley artillery practice field.

The public school system of San Antonio is of the first order; it includes thirty-five graded and high schools, the schools for Negroes being separate. There are also many private and preparatory schools. The city maintains a number of modern hospitals, and the charitable institutions are numerous. San Antonio is a favorite resort for those who suffer from pulmonary diseases.

INDUSTRY AND COMMERCE. San Antonio had, at the last industrial census, upward of 400 large and small manufacturing establishments, producing a variety of commodities; flour, clay products, foundry and machine shop products, refinery products, cement, building iron and dressed meats are a few of them.

The city is the commercial center for a large part of southwestern Texas. Live stock, especially cattle, is the first item of trade, and cotton, grain, wool, mohair, hides, fruit and pecans are shipped in large quantities.

HISTORY. Though the first permanent settlement was made on the site of San Antonio in 1718, it is commonly believed that white settlers were on the ground as early as 1715. The mission of San Antonio de Valero and the Presidio of San Antonio de Bexar were founded in 1718 by Spaniards from interior Mexico. A small colony from the Canary Islands settled here a few years later, and while Texas was a Mexican province San Antonio was the capital. While Mexico and Spain were at war San Antonio was the scene of a number of sanguine battles, and during the Mexican War eight battles were fought here. In 1836 occurred the Battle of the Alamo, during which the entire American force was annihilated by the Mexicans under Santa Anna (see TEXAS, subtitle *History*).

A period of commercial inactivity ensued, but with the revival, the city grew rapidly. In 1878 the first railroad was extended to San Antonio; industry and commerce increased, and many new settlers arrived in the city and in the surrounding country. Population in 1880, 20,550; in 1920, 161,379.

San Bernardino, Cal., the county seat of San Bernardino County, is 60 miles east of Los Angeles, on the Southern Pacific and the Atchison, Topeka and Sante Fe, and Union Pacific railroads. Owing to its beautiful scenery and fine climate, the city is a popular summer and winter resort. It is the center of a bountiful agricultural region, and is a shipping point for large quantities of citrus fruit and hay. The Santa Fe Railroad has extensive shops here, employing almost 3,500 men. The chief manufactures are boxes and crates, artificial stone, and foundry and machine shop products. The Southern California Hospital for the Insane is located here.

The city has a high school and graded schools, a business college and a Carnegie library. San Bernardino was founded by a company of Mormons in 1851, and is built on the site of an old Spanish mission. Population in 1920, 18,721.

Sancho Panza. See DON QUIXOTE.

Sand, ordinarily, a kind of soil, forming,

with clay and mold, the surface of the agricultural portions of the earth. Vast stretches of country are covered with sand. Pure sand consists of finely ground crystalline rocks, chiefly quartz. It is present in almost all soils and on careful examination shows all degrees of age. Some grains have sharp edges like newly fractured bits of glass, others are worn smooth and round by constant rubbing together. Sand varies in color, owing to tinctures of different minerals. Iron gives sand a reddish tinge. The term has passed into traditional use. "Sand in one's make-up" is another expression for true grit. No tie can be more worthless than "a rope of sand." The "sands of life" have reference to the running sand employed in hour glasses to denote the passing of time. "To sand one's track" means to render assistance. It is derived from the custom of locomotive engineers who dribble sand in front of their driving wheels to prevent them from slipping. The uses of sand in the industrial arts, as glass-making, plastering, concreting, molding, and the like, are numerous. Special articles may be consulted. See SILICON; CONCRETE; GLASS, etc.

Sand, George, (1804-1876), the pen name of Amantine Lucile Aurore Dupin, a French author. She was born in Paris, but was brought up at the Chateau of Nohant. She was educated at a convent, and in 1822 was married to M. Dudevant. The marriage proved unhappy, and in 1831 Madame Dudevant left Nohant and went to Paris with Jules Sandeau in order to lead an independent life. She began her literary work in collaboration with Sandeau, and her pen name was an abbreviation of his name. Her first independent novel was *Indiana.* Others are *Valentine, Leila, Lavina, Metella, Simon, La Comtesse de Rudolstadt, Horace,* and *Consuelo.* Her earlier writings are filled with the spirit of revolt against moral and social conditions. Her later works contain studies of country life and manners. Perhaps the most remarkable feature of her career as an author is the rapidity with which she produced volume after volume for many years. She was at one time much occupied with theological and philosophical speculations. She also entertained republican ideas of an exaggerated nature, and her views of life were one-sided. *Consuelo* is her best known work. The reputation of George Sand was extraordinary in her own time; but her works no longer occupy the place they once filled in the world of literature.

Sandal, a sort of covering for the sole of the foot. The sandal was worn by the ancients,—Jew, Greek, and Roman. It is consisted of a piece of flat sole leather shaped to the foot, or else of a similarly shaped piece of cork covered with leather, both above and below, and stitched around the edge. The sandal was held to the foot by thongs. In the days of Roman luxury the sandal and its straps were ornamented with large buckles of gold and silver, and were adorned even with jewels. It was a comfortless sort of foot gear, that excluded neither rain, mud, nor dust. One of the first courtesies offered a guest, in fact, one of the first rites of hospitality, was that of foot washing. It would seem ridiculous enough now-a-days to usher a guest into the best apartment and then rush away for a basin of water to wash his feet. Of modern people the Japanese and Chinese still wear sandals. At entertainments they check their sandals as Europeans do their wraps. The oriental sock is divided. The great toe is provided with a separate compartment like the thumb of a mitten, so that it may be inserted under the strap of the sandal.

Sandalwood. the fragrant heart wood of several species of evergreen trees, chiefly oriental. The principal supply of sandalwood comes from India and the Malay Archipelago. Foresters fell the trees when they are about a foot in diameter. The trunks are left lying in the forest for a season. The white ants strip off the bark and sap wood. The heart wood is then cut into lengths of thirty inches and trimmed for market. Sandalwood makes excellent material for fans, toilet boxes, carved work, and articles of fine furniture. It not only works up well, but it is fragrant and free from the attacks of insects. When polished, it has a fine glossy appearance. The devotees of India consider sandalwood the most suitable fuel with which to cremate the bodies of their friends. Large sums are expended for the purpose.

Sand Blast, a stream of sand propelled by steam or compressed air and used for cutting, or engraving glass, stone, and other hard materials. The use of steam has the advantage of rapidity in the cutting process. If sand is used it is driven through a cylinder which contains a number of smaller tubes within, through which the sand is driven and ends in a narrow slit. Rubber, wax, or elastic material is used to serve as a protection for the parts of the glass that are not intended to be cut. Benjamin C. Tilghman invented this process, as a result of observing the fact that wind-blown sand acted readily on glass and destroyed its transparency.

San Diego, Cal., a port of entry and the county seat of San Diego County, is the fourth city of the state. It is in the extreme southwestern part of the state, on San Diego Bay and on the Atchison, Topeka & Santa Fe and San Diego & Arizona railroads, 125 miles south by east of Los Angeles.

DESCRIPTION. San Diego Bay is the only protected, deep water harbor between Panama and San Francisco; the harbor is 22 square miles in area, and both the navy and the army have tracts of land on the shore of the bay—for a naval coaling station, a fort, aviation fields and naval base. Attractive features of the city are Fort Rosencrans, Fort Stockton, the United States naval base, United States marine base, Rockwell aviation field on North Island, an old Spanish mission, the botanical gardens, exposition buildings, Federal building, the Japanese garden, the Plaza, Balboa Park, Masonic Temple, La Jolla caves, and Tia Juana, on the Mexican line.

The educational institutions of San Diego comprise the public graded and junior and senior high schools, a state teachers college, junior college, the Theosophical school, San Diego Army and Navy Academy, United States Aeronautic School, Academy of Our Lady of Peace and a public library.

INDUSTRY AND COMMERCE. San Diego has numerous industrial establishments, in which are produced automobile tires, canned fruit, canned fish, dressed meats, furniture, flour, wagons, olive oil, citrus products, such as oil of lemon and oil of orange, refined salt and other commodities. Fruit and grain are the leading exports.

HISTORY. San Diego is the oldest settlement in the state, a mission having been founded here in 1769. The ruins of this mission are still to be seen. The pueblo of San Diego was taken for the United States by Commodore Stockton, 1846, and the fort that was established then still bears Stockton's name. The city has been a port of entry since 1873. In 1920 the population was 74,683.

Sandpiper, a name applied to numerous species of the snipe family. The North American species are found from the Yukon Valley to the Gulf. They are strictly shore birds frequenting both the seacoast and inland waters. Of one species Chapman says:

> The thought of these little sandpipers always creates a mental picture of a long stretch of dazzling beach with its ever-changing surf-line. I hear the oft-repeated booming of the rolling, tumbling breakers, and in the distance see a group of tiny forms hurrying to and fro over the sand smoothed by the frothy waves. With what nimble gracefulness they follow the receding waves, searching for treasures cast up by the sea! What contentment and good-fellowship are expressed by their cheery, conversational twitterings! Up and down the beach they run, now advancing, now retreating, sometimes, in their eagerness venturing too far, when the waters threaten to ingulf them, and in momentary confusion they take wing and hover back to a place of safety. Suddenly, as though at a signal, they are off; a compact flock moving as one bird, twisting and turning to right and left, now gleaming white as the sun strikes their snowy bodies, now dark again like a wisp of sunless cloud flying before the wind.

The sandpipers are small birds with straight bills. In a classification they stand between the snipe and the plover.

Sandstone, a rock composed of grains of sand held together by some cement. When grains of silica are bound and stained by iron oxide a brown sandstone is formed. Such sandstones are found at intervals from the Atlantic to Minnesota, and are used for the famous brown sandstone fronts of New York and other cities. Sometimes the binding material is lime or clay, forming lime and clay sandstones. The materials are usually sorted by the action of water. Sandstones frequently show the ripple

marks of old shores, and have preserved the tracks of wading birds and other animals long since extinct. Grindstones are made usually of a fine grained sandstone. See SAND; GRINDSTONE; BROWNSTONE.

Sandusky, Ohio, a port of entry and the county seat of Erie County, is on Sandusky Bay at the mouth of the Sandusky River, about five miles from Lake Erie. It has an excellent harbor, and has steamer connection with American and Canadian lake ports almost all year. Near the city are several islands, and there are half a dozen pleasure resorts within easy reach in the summer months. Sandusky carries on an extensive trade in coal, ore, sugar, fruits, lumber, grain and fish; and her manufactures include chemicals, paints, crayons, dyes, dynamos, glass, cement, furniture, automobile and aeroplane engines, paper, tools and barrels.

Here are located state and United States fish hatcheries. The city has a state soldiers' and sailors' home, modern high and graded schools and a library. Population, in 1920, 22,897.

Sandwich Islands. See HAWAII.

Sandy Hook, a sandy peninsula six miles long and having an average width of three quarters of a mile, that runs northward from the New Jersey coast and partially encloses lower New York Bay. At the northern extremity of the Hook is Fort Hancock. Also near the northern end is a lighthouse 88 feet high, and the United States proving grounds, where heavy ordnance and armor plate are tested. It is chiefly in the latter connection that the peninsula is important.

San Francisco, săn frăn-sĭs′ kō, a city of California, is the largest and most important seaport on the American Pacific. The city is built on a peninsula between San Francisco bay and the ocean. The commercial district lies on the eastern or harbor side. Market Street, a broad thoroughfare, leading southwestward from the Ferry Building into the interior of the peninsula, divides the city into north and south sections. The western or ocean side of the penisula is occupied chiefly by three military reservations and by city parks, boulevards, a cemetery, a life-saving station, and by residence districts. There are several hotels for sightseers. The piazzas of the Cliff House, built on a crag, commanding a grand view of the ocean, are a favorite resort of tourists. The gambols and barking of sea lions are a never-ending source of pleasure.

The bay is entered from the ocean by a strait called the Golden Gate. It is a mile in width at its narrowest point and is deep enough for the entrance of the largest ships, regardless of tide or season. The bay within forms one of the largest harbors in the world. It is seventy miles in length and from five to ten miles in width. It is protected from storms in all directions. Capacious wharves and warehouses have been built to accommodate the seagoing trade. The harbor is visited regularly by about five hundred sailing vessels and nearly half as many steamships. Regular communication is maintained with ports along the coast from Sitka to Valparaiso. Ocean liners run to Hawaii, China, Japan, the Philippines, Samoa, New Zealand and Australia. Freighters ply by way of the Panama Canal to New York and other Atlantic ports and to the cities of western Europe. Some of the distances by water are as follows: To Honolulu, 2,100 miles; Yokohama, 4,525; Manila, 6,250; Singapore, 7,850; Sydney, 7,210; New York, 5,270; Seattle, 804; Los Angeles, 400. By rail, San Francisco is 2,357 miles distant from Chicago; 3,269 miles from New York; and 2,490 from Orleans.

The total exports by sea of wheat, flour, barley, canned fruits, dried fruits, quicksilver, silver, gold and minor articles are valued at not less than $240,000,000 a year. Imports of tea, coffee, sugar, rice, whale oil and coal are correspondingly large. The Southern Pacific Railway enters the peninsula from the south. Communication between the city and trains of the several lines of railroad from east, north and south is maintained by means of enormous railway ferries. They ply between the wharves of San Francisco and the eastern shore of the bay, just as the ferries at New York ply between the city landings and the railway terminals on the Jersey shore of the North River. The articles of import mentioned

are shipped eastward by rail to different centers of distribution. Millions of pounds of tea are received annually. About three times as much coffee is handled. The principal articles of home production shipped by rail are wool and dried fruits. The fresh fruits of California are shipped from points lying eastward and southward.

The manufacturing interests of the city are very large. There are over 4,000 establismnets. Almost the entire sugar and molasses production of the Hawaiian Islands is refined here, and at Crockett on Carquinez Straits. Slaughtering and meat packing is the second industry in monetary value. The work of foundries and machine shops comes next. There is considerable shipbuilding. The canning of fruits and vegetables is represented by an output of from $4,000,000 to $4,500,000 a year. There are also manufactures of boots and shoes, saddles, harness and grain sacks. Gunpowder and dynamite are manufactured in large quantities in the hills far east of the bay. About 2,000,000 cases of salmon from the canneries of Columbia and Alaska are handled by the San Francisco wholesalers.

So far as known, SanFrancisco was visited by Europeans for the first time in 1769. In 1776 a Spanish fort and mission were established here. Upon the establishment of the Mexican republic in 1821 the city passed with the rest of California under Mexican rule. July 9, 1846, the city was occupied by an American naval force. It was ceded to the United States with California at the close of the war. The discovery of gold in 1848 led to the temporary abandonment of the city. Everybody who could possibly get away left for the gold fields. At one time every official had left town. The newspapers suspended publication and the town was without a vestige of government. The immense trade which sprang up in connection with supplying the mines with the necessities of life brought on a revival of business. The city leaped forward in population. In 1851 and again in 1856 crime had grown so rampant that the citizens reorganized a vigilance committee formed some years before, and for several months hunted down desperadoes and evil characters with determination. Many were hung in front of headquarters; others were driven from the city.

The city owns and operates one of the street railway systems, but the other as well as the water works, gas works and electric light systems belong to private corporations. The retail district is on Market Street and adjoining sections of Geary, Kearney, Post and Sutter streets. The chief business center is at the intersection of Market, Kearney, Geary and George streets. The most noted buildings in the business center include the United States Subtreasury, San Francisco Stock Exchange, the Federal building, the Hobart building, the Standard Oil and the Pacific buildings. The great hotels—the Palace, Fairmont and St. Francis—are among the most noted structures in the city.

The civic center at the junction of Market Street and Van Ness Avenue is surrounded by one of the finest groups of public buildings in America. These include the City Hall, the Municipal Auditorium, in which was held the Democratic National Convention, in 1920, the opera house, the museum, the state building and the public library.

Chinatown, occupying fifteen blocks in the heart of San Francisco, is a foreign city in which no white persons dwell. It was destroyed by the great fire in 1906, but was rebuilt on a more modern plan. Here may be seen rites and daily customs of the Chinese as they are practiced in China.

On April 18, 1906, San Francisco was visited by the severest earthquake that the United States has ever known. Many buildings in the business center of the city were reduced to ruins; telephonic and telegraphic communications were interrupted; the street railways in the down town section were wrecked and the water and gas mains were severed. Immediately after the quake fire broke out in the down-town sections and more than four square miles of the city were burned over. The property damage was estimated at $250,000,000 and more than 400 people lost their lives. The city recovered from this disaster with

remarkable rapidity and within ten years the devastated region was rebuilt with modern structures of steel and concrete. In 1915 the Panama-Pacific International Exposition was held here. The population includes representatives of almost every nationality. The city has grown rapidly and in 1920 had 506,676 inhabitants. See CALIFORNIA; EARTHQUAKE.

San Graal. See HOLY GRAIL.

Sangster, Charles (1812-1893), a Canadian poet and journalist, was born at Kingston, Ontario. While yet in his youth, Mr. Sangster edited a newspaper at Amherstburg and later at Kingston; and from 1868 to 1886 he held a position in the Ontario Postoffice Department. He was one of the first of English-Canadian poets and it is conceded that his songs of patriotism went far toward bringing the harmony of confederation to the quarreling Canadas—Upper and Lower. Among his published volumes are *The St. Lawrence and the Saguenay, and Other Poems;* many of his poems were not published in book form.

Sangster, Mrs. Margaret Elizabeth Munson (1838-1912), an American editor and poet. She was a native of New York state. At the age of twenty she married George Sangster. She soon began writing for various periodicals, and in 1871 became associate editor of *Hearth and Home.* She was successively editor of *The Christian at Work,* and of *Harper's Bazaar,* and in 1899 became a staff contributor to the *Ladies' Home Journal.* Her books include *May Stanhope and Her Friend, Little Knights and Ladies, Poems of the Household, Home Fairies,* and *Winsome Womanhood.* Mrs. Sangster is best known for some of her short poems. *Our Own, Are the Children Home?* and *Elizabeth, Aged Nine* are favorites.

San Jose, Cal., the county seat of Santa Clara County, is on the Guadalupe and the Coyote rivers, and on the Southern Pacific Railroad, 47 miles southeast of San Francisco, and 7 miles from San Francisco Bay, with which it has steamer connection. It is situated in the fertile and beautiful Santa Clara Valley, where prunes, grapes, peaches, plums, olives, apricots, cherries, wheat and barley are grown in abundance. The industrial life of the city is connected with the canning, drying, crating and shipping of fruits. There are canneries, packing houses, lumber mills, can, box and basket factories and flour mills. The manufacture of canning machinery is important. The city contains the University of the Pacific, the College of Notre Dame, a state teachers' college, high and graded schools and two libraries. San Jose is rapidly gaining popularity as a residential city and as a health resort. It has mineral springs and a very healthful climate. In 1920 the population was 39,604.

San José (hō-sā′) **Scale,** an orchard insect pest. It is related to the mealy bugs and the nutgall insects. It is related, therefore, to the cochineal insect and to the oriental wax-producing insects. A close relative may be found on the twigs of the common white elm. There are many scale insects. The one in question is a native of China. It is supposed to have come to this country on nursery stock. It became a pest in the Santa Clara Valley of California. It infests the twigs and bark of the common orchard fruits, as the apple, cherry, peach, plum, and pear. It is troublesome also on gooseberry and currant bushes; on walnut, elm, oak, chestnut, and many other valuable trees and shrubs. An allied scale insect is a foe of the orange grower.

The life history of a scale insect is of interest. The young are small lice. They run about for a few hours or days feeding on tender green leaves. At this stage they may climb from tree to tree or be carried on the feet of birds and by flying insects. In a short time the young louse settles down, inserts its beak into the bark, sucks sap, and proceeds to grow. As the body increases the insect sheds the skin for a new one. The cast skins, together with wax excreted by the body, form a flat, papery scale or shield under which the insect continues to live. The male develops a pair of wings, loses its mouth parts, and comes out to fly about for a day or two before dying. The female grows, but never leaves the scale. It does not develop wings, but sheds all three pairs of legs and begins to lay eggs, shrinking as the process continues until but a shriveled dead skin remains.

The San Jose Scale was first discovered

in California in 1880. Within fifteen years it had spread over the country and it is one of the most destructive pests with which the orchardist has to contend. The Chinese ladybird beetle destroys large numbers and the chalcid fly destroys the adult insect. But spraying with an insecticide poisonous to sucking insects, such as the "California Wash"—a mixture of lime sulphur and salt, or whale oil soap, kerosene emulsion or crude petroleum is the only effective means of checking the pest. The spraying must be so thorough as to moisten the body of each insect, or the work will not be effective. The use of a spraying apparatus designed for the purpose is advisable.

See SPRAYING; PARIS GREEN; BORDEAUX MIXTURE; CODLIN MOTH; SCALE INSECTS; GALL.

San Marino, săn mä-rē′nō, the smallest republic in the world. It lies entirely within Italian territory on a spur of the Apennines, overlooking the Adriatic Sea. Area, thirty-eight square miles; population, 12,002. The inhabitants are engaged chiefly in raising cattle, pressing wine, and quarrying stone. The capital, a city of the same name, has a population of about 2,000 people. It is situated on a crag which is surrounded by a strongly fortified wall. The principal manufacture is silk. The government of the tiny republic is administered by a council of sixty members elected from the ranks of noble citizens and peasants. For so small a commonwealth, the government buildings are surprisingly massive and costly.

Italy has been fertile in republics. In the turmoil of the Middle Ages there arose a host of free municipalities, turbulent, quarrelsome, but, on the whole, self-governing. Some of these became very rich and powerful—Venice and Genoa in particular. The most of them gradually lost their liberties, and either became despotisms, like Florence, or were merged in some greater power. Venice and Genoa survived until the end of the eighteenth century. One of this medieval cluster still exists—the independent republic of San Marino. This little town of 8,000 people is an odd medieval petrifaction in the midst of our nineteenth century. Perched amid the Apennines, it has kept its freedom through all the changes which have swept over the peninsula. It was not overthrown in the past, because nobody particularly cared to attack it. It is preserved now partly because of the respect which modern and liberal Italy has for free institutions, and partly because the Italians are rather proud of its antiquity. They regard it as an interesting freak. It is bound to Italy by a treaty of friendship made in 1872.—H. P. Judson, *Europe in the Nineteenth Century.*

San Martin, Jose de (1778-1850), a South American general who won fame in the war for freedom from Spanish rule, was born at Yapeyu, Argentina. He received his education in Spain, and while still resident there entered the Spanish army and fought against France. In 1811 he removed to Buenos Ayres, and soon joined the revolutionary forces. His first service against Spain he saw in 1813, when he defeated a Spanish army at San Lorenzo. He next appeared in Chile, where he was again victorious. After two years of careful planning and organizing, he marched into Peru with an army of 4,000 men; he met the Spanish forces at Chacabuco and defeated them. In Chile, General San Martin was again successful, and upon his return to Peru in 1821 the Republic of Peru was established. General San Martin was chosen Protector, but he gave his office and his command to Bolivar in 1822. He departed secretly for Europe, living the remainder of his life in quiet in Belgium and France, and refusing to involve himself in further strife.

San Salvador. See BAHAMAS; COLUMBUS; SALVADOR.

Sanskrit, the name applied by scholars to the ancient literary language of India. It is the literary language of the ruling caste, a language related, as is now well known, to that of the ancient Greeks and Romans and to the tongues of western Europe. Many common words are almost identical with the corresponding words in English, German, French, Italian, etc. The Sanskrit alphabet consists of fifty letters. Fourteen vowels are recognized. To those unacquainted with the subject the volume and breadth of Sanskrit literature is surprising. The sacred writings consist chiefly of hymns, chants, and prayers. They are made up in four collections called the *Veda.* The first collection is known as the *Rig-veda.* It contains 1,028 hymns, in all, 10,600 verses. The other collections

consist of ceremonial chants, sacrificial prayers, mystic hymns, marriage ceremonies, burial rites, and the like.

There are two Sanskrit epic poems of great length, the first, the *Ramayana,* containing 48,000 verses, celebrates the deeds of a certain king and his four sons. An enormous bow, a female demon, the king of the monkey tribe, a bridge built of rocks and trees by monkeys and an ordeal by fire are included in the subject matter. The other, the *Mahabharata,* called, by way of translation, The Great Poem, contains 200,000 complete verses. It is nearly eight times as long as the *Iliad* and *Odyssey* combined. There are many other epics, some of them written as recently as the sixth century of the Christian era.

The list of dramas includes about fifty plays. There are also collections of lyric, descriptive, and didactic poetry, as well as volumes of fables and narrative. One book of fables purports to relate the advice given by two jackals who play the part of counselors to the lion, king of beasts. Others are collections of fairy tales. One series of fables, believed to have been written or compiled about the twelfth century, contains seventy stories related by a parrot. Another

Sanskrit is a regular subject of instruction in the universities of India and of Europe. It is interesting to know that one of the most learned Sanskrit scholars of modern times, Professor William Dwight Whitney of Yale, was an American. His grammar of the Sanskrit language is a leading college text on that subject.

See INDIA; MAHABHARATA.

Sanskrit Literature. See SANSKRIT; INDIA; MAHABHARATA.

Sans Souci. sän sōō-sē′. See POTSDAM.

Santa Ana, the county seat of Orange County, Cal., is 33 miles south by east of Los Angeles, on the Atchison, Topeka & Santa Fe, Southern Pacific and Pacific Electric railroads. The principal industrial establishments are beet sugar factories, fruit canneries and packing plants, and a foundry. The largest item of commerce is the fruit grown in the vicinity.

The city has graded schools, a polytechnic high school, a Carnegie library, and fine city, county and Federal buildings. In 1920 the population was 15,485.

Santa Anna, sän-tä än′ä (1795-1876), a Mexican adventurer, soldier, and dictator. He entered the Spanish army when but fifteen years of age. During the war for independence he served in the Spanish ranks until he saw that Mexico was really to be successful. He then went over to the Mexican side and gained his birthplace, the city of Vera Cruz, for Iturbide, the Mexican patriot. He was himself five times president or dictator of Mexico, and was three times driven into exile. On the declaration of independence by Texas in 1835 he entered the state at the head of an armed force and disgraced himself by butchering the American garrison of the Alamo. He was defeated in the battle of San Jacinto, April 21, 1836, and was held a prisoner until he had signed a treaty acknowledging the independence of Texas.

The cession of Texas made him unpopular at home. He regained popularity by the successful defense of Vera Cruz against a naval attack by the French. He lost a leg in this siege. When war between the Mexicans and the United States was about to begin, Santa Anna was in exile. He hastened home and was placed at the head of the Mexican forces. He was defeated in person by General Taylor at Buena Vista in 1847. In 1855 he was deposed from the presidency for the last time, tried for treason, and banished. His large estates were confiscated. During the temporary occupation of Mexico by French troops, he schemed to assist the French. During the American Civil War, French troops entered Mexico, established a kingdom, and placed Maximilian on the throne. Santa Anna at this time resided in New York City, but it was well known that he had assisted the French with his advice. In 1874 he returned to his native country, where he died in poverty and obscurity. He was a man of undoubted ability, but utterly unprincipled, not to say cruel and treacherous. He does not merit the name of Mexican patriot. See ALAMO; MEXICO.

Santa Barbara, Cal., the county seat of Santa Barbara County, is on the Santa Barbara Channel and on the Coast Highway, 100 miles west by north of Los Angeles. The city is built on ground that slopes upward from the bay to the mountains of the

Santa Ynex Range, which rise to an elevation of 4,000 feet. Because of its unusual location, enclosed by mountains and fronting the sea, the climate is mild in winter and cool in summer. There is a broad safe bathing beach, extending along the entire ocean front of one and one-half miles.

Santa Barbara is important commercially as the outlet for a rich agricultural region, and the principal industrial establishments are engaged in fruit packing and canning. It is a seaport for coast freight and passenger boats.

Besides an excellent public school system, the city has a state teachers' college, attractive library, courthouse, city hall and many fine public buildings. The old mission is one of the best preserved of California's Spanish missions and is especially noteworthy from the fact that it is still occupied by Franciscan monks. In conjunction with the mission is St. Anthony's College, where young men may study for priesthood. Among the best hotels are the Arlington, El Mirasol, El Encanto, new Carrillo and the Samarkand, a Persian hotel. The old presideo in the center of the city is being reestablished by the rebuilding of many of the old adobe structures of the early pioneer days. Santa Barbara had 19,441 inhabitants in 1920.

Santa Catalina, an island off the coast of California. It is one of the Santa Barbara Islands. It is separated from the mainland by a channel. The island is twenty-five miles long and about four miles wide. It is hilly, well wooded, and is a noted summer resort. The floor of the sea surrounding the land supports a submarine forest of kelp, the ribbon-like leaves of which rise and fold and unfold in the water, affording an abiding place for countless animals of the sea. The kelp viewed in the sunlight forms a beautiful picture of olive and amber in the blue turquoise of the water. Tourists are taken about by guides in glass-bottomed boats. As the boat

Santa Claus. See NICHOLAS, SAINT.

Santa Fé, sän'tä fā', the capital of New Mexico. It was founded by the Spaniards in 1605. It ranks next to St. Augustine as the oldest European settlement within the limits of the United States. It is situated in the north central part of New Mexico, twenty-one miles east of the Rio Grande. In 1630 the town contained 250 Spanish inhabitants. In 1680 the region contained about 2,500 Spanish colonists, including soldiers and priests. In that year there was a general uprising of the Pueblo Indians. Four hundred colonists were killed. About 1,000 people took refuge in the Santa Fé Palace. They made a successful sortie against the Indians, killed about 300 of them, and captured and hung 50 others. It was deemed wise, however, to abandon the settlement, and the colonists took up a long and painful overland journey for El Paso, Texas. Twelve years later the town was re-occupied by a colony of 800 settlers, who were annoyed by Indians.

From the time of its first settlement, Santa Fé has been an administrative town. It was made the seat of a Catholic archbishopric. The town was early a distributing center. It was reached by the great Santa Fé Trail. This famous route left the Missouri River at Independence and struck westward across the prairies for the upper valley of the Arkansas. It then followed this stream westward. Farther on, travelers were guided by wagon mound, a lone mountain visible for a great distance. Blankets, clothing, salt meats, tobacco, liquors, candles, oils, ammunition, firearms, harnesses, saddles, traps, cutlery, matches, and the thousand and one articles desired by a trapping, mining, and ranching population, were shipped from St. Louis up the Missouri to Independence. Here they were loaded on pack mules or into huge wagons drawn by strings of horses. For the better protection against Indians, the proprietors combined temporarily, electing one of their number commander for the trip. Convoy after convoy went creaking westward during the hauling season, bringing up after weeks of travel at Santa Fé. The central plaza and the surrounding prairie were a bustling scene. Goods were distributed from this point in every direction as far as Chihuahua, Mexico. In the year 1844, when the traffic over the Santa Fé Trail reached its height, it is estimated that no less than $750,000 worth of goods were hauled overland over this famous old western trail to Santa Fé. The construction of railways has left Santa Fé rather at one

side. The wholesale business now favors Albuquerque.

The population of Santa Fe has grown rapidly. In 1920 it was 7,000, a gain of 2,000 in ten years. The city is now maintained by government business, trade with the ranchers and miners of the surrounding district, and by tourists, great numbers of whom are attracted by the delightful climate. The city stands at an elevation of 6,998 feet. There are numerous large hotels. The most noted edifice is a large, rectangular, one-story, adobe government building, occuping the entire northern side of an open square known as the Plaza. A covered veranda, resting on pillars, runs the entire length of the building. This building was occupied by the Spaniards as government headquarters. General Kearny took up his quarters here. Lieutenant Pike, for whom Pike's Peak was named, was detained here. General Lew Wallace, at one time governor of the territory, finished writing *Ben Hur* in one of the rooms of this old "Palace." The territorial authorities of New Mexico left it for a new capitol building of brick and stone built in 1900 at a cost of $200,000. One old two-story adobe building is evidently of Indian origin. It is believed to antedate Spanish occupation. It is considered by many the oldest dwelling house in the United States. The Roman Catholic Cathedral is a modern sandstone structure. The earthworks of old Fort Marcy, erected by General Kearny during the Mexican War, are still to be seen.

See New Mexico; Adobe; Pueblo.

Santiago, sän-tē-ä′gō, the capital of Chile. To distinguish it from Santiago, a mining and cathedral city of Cuba, it is called frequently Santiago de Chile. It occupies an inland position, in a fertile plain at the foot of the Andes, about 2,000 feet above the sea. Valparaiso, ninety miles distant, is the seaport. The city was founded in 1541. The climate is delightful. The region is fertile. Frost occurs occasionally. Snow is unknown. The region is celebrated for grapes, figs, melons, and other fruit. The scenery, especially in the direction of the Andes, is magnificent beyond description. The city has suffered severely at times from earthquakes, yet it possesses many handsome public buildings. A central square is adorned with a fine fountain. On the west side stands the cathedral. Among the public institutions clustered at Santiago are a university, a normal school, a cathedral, a military school, an art school, a music school, a national library, and a mint. In 1863 a Jesuit church was destroyed by fire during services. Two thousand of the congregation, chiefly woman, perished in the flames. A railroad connects the city with its port. The exports are chiefly gold, silver, lead, and fruit. The population, which is increasing, was in 1920 about 507,300. The dominant social element is Spanish.

Santiago, Battle of. See Spanish-American War.

Santo Domingo, sän-tō dō-mēn′gō, an independent republic occupying the eastern portion of the island of Haiti. Area, 18,750 square miles. The surface is broken by rough, parallel mountain ranges rising to a height of 10,000 feet. The climate varies greatly. The coast and low valleys are intensely hot, almost unfit for white men. The region above 1,600 feet in height has cool nights and is reckoned temperate and healthful. The amount of rainfall is determined largely by the situation with reference to the winds and mountains. Sandy, scorched, arid regions are succeeded by regions of unsurpassed fertility. The mountain sides that catch the rain are clothed with tropical forests. The opposite slopes may be composed of bare rocks. Gold and silver were found formerly in abundance. Iron, tin, and platinum exist. There is an abundant supply of durable building stone, including marble.

The country became independent of Spain in 1821, and separated from Haiti in 1844. Various schemes have been on foot for annexation to the United States. The form of government is republican. The Congress consists of a single house. The president is not eligible for reëlection. The republic is a member of the postal union. There were, in 1922, 153 miles of railway. Wagon roads are still few. Communication by cable is maintained with the outside world. The American gold dollar is the basis of coinage. The inhabitants number about 700,000. Aside from a few

of pure Spanish descent, the people are a mixed race. Spanish, Indian, and negro elements are blended. Spanish is the national language; Roman Catholic, the national religion. A system of public education embracing elementary, normal, and high schools, as well as a university, has been established and is taking shape slowly. Expensive and devastating wars with the sister republic of Haiti have held civilization back.

The principal productions are sugar, coffee, tobacco, cocoa, and bananas. Other articles of export are mahogany, logwood, goatskins, oxhides, honey, deer horns, moss, cedar, tortoise shells, and rum. The total export business amounts to about $14,000,000 a year.

Santo Domingo, the capital of the republic, is a city of about 45,000 inhabitants. It was founded by Columbus on his third voyage, and was for a time the capital of the Spanish West Indies. It still has a decidedly Spanish appearance. At his death, Columbus desired that his body be sent from Spain to be buried in the Cathedral of San Domingo.

Internal troubles in the little republic during the period 1863-1904 resulted in a debt of $32,000,000. This, in view of the general situation in the country, could not be paid, and there were indications that certain European nations would take drastic measures to collect. In 1905, therefore, the United States negotiated a protocol and undertook the adjustment of the country's debts and the administration of its custom receipts. In 1907 a treaty was signed that provided for United States administration of Domingan customs for 50 years. A certain amount of conflict arose between the American officials and the government of the republic, and in 1913, 1915 and 1916 the United States was compelled to suppress revolts. In 1919 a Domingan commission for the restoration of individual liberty visited Paris and Washington. Thereupon the American governor of the republic began making arrangements for the conditional withdrawal of the American military force and for the erection of a responsible native government. In 1922 the American government began to concentrate the American marines on the island, preliminary to ultimate evacuation.

STATISTICS. The following are the latest reliable statistics to be had:

Land area, square miles	19,332
Forest area, acres	9,500,000
Population (1921)	897,405
Chief Cities:	
Santiago de Los Caballeros	71,956
La Vega	58,041
Ciudad de Santo Domingo	45,021
San Francisco de Macoris	42,432
Ciudad de Puerto Plata	26,073
Number of provinces	12
Members of senate	12
Members of house of representatives	24
National revenue	$12,000,000
Bonded indebtedness	$13,100,786
Farm area, square miles	15,500
Cacao, pounds	51,457,795
Tobacco, pounds	8,000,000
Sugar, pounds	424,461,160
Domestic Animals:	
Horses	162,800
Mules	64,860
Cattle	559,282
Oxen	87,876
Goats	705,000
Swine	674,232
Imports	$55,000,000
Exports	$70,000,000
Miles of railway	153
Teachers in public schools	1,544
Pupils enrolled	105,000

Sap, the circulating fluid of plants. Sap is to the plant what blood is to the animal. It courses through passages corresponding to the veins and arteries of an animal. It is like blood in that it consists largely of water, carrying nutritive particles from the ground to the parts of the plant where they are needed. It also circulates through the leaves and other breathing portions of the plants, presenting itself to the influence of the sunlight and of air. Plant life is as dependent upon sap as animal life is dependent upon blood. The analogy between sap and blood may be carried still farther. In addition to blood, the body of an animal may contain other liquids, as saliva and lymph; so, in addition to sap, many plants have special ducts containing liquids other than sap. Turpentine, for instance, is made, not from the sap, but from the contents of the turpentine ducts of the southern pine. Many economic uses are made of sap. The juices of fruits are hoards of concentrated sap; we have sugar and sirups from the sap of the maple and the sugarcane; rubber from the sap of the rubber

tree; opium from the sap of the poppy plant; and pulque from the sap of the agave plant. Many gums are the dried sap of corresponding shrubs and trees. See TURPENTINE; MAPLE; RUBBER; SUGAR; OPIUM.

Sapphire, săf'ir, a beautiful, transparent, precious stone. It is a form of corundum. It is akin to the red ruby, but differs from it in being of a blue color. A yellow sapphire is known as a topaz; a green, as an emerald; a violet as an amethyst. The finest sapphires are perhaps those of Ceylon, Cashmere, and Siam. Beautiful sapphires are obtained from Queensland, Australia. Sapphires of a rich, delicate blue color are found in the gold-bearing gravels of Montana. The sapphire owes its beauty to a quality akin to phosphorescence. See CORUNDUM; RUBY.

Now glowed the firmament with living sapphires.
—Milton, *Paradise Lost.*

Sappho, săf'o, a Greek lyric poet who flourished about 600 B. C. According to all accounts she was a native of Mitylene in the island of Lesbos, where she spent her life. She was a woman of noble birth. One brother was a cupbearer; another a wealthy merchant. Her home was the center of a coterie of literary women, the earliest association of the kind known. Of nine volumes of lyric poems by Sappho, all but an ode to Aphrodite and a few fragments are lost. A brilliant hummingbird with a long, forked tail has been named Sappho in her honor.

Among the ancients Sappho enjoyed a unique renown. She was called "The Poetess," as Homer was called "The Poet." Aristotle quoted without question a judgment which placed her in the same rank as Homer. Plato, in the Phaedrus, mentioned her as the tenth Muse. Solon, hearing one of her poems, prayed that he might not see death till he had learned it. Strabo speaks of her genius with religious awe. Longinus cites her love-ode as a specimen of poetical sublimity. The epigrammatists call her Child of Aphrodite and Eros, nursling of the Graces and Persuasion, pride of Hellas, peer of Muses, companion of Apollo. Nowhere is a hint whispered that her poetry was aught but perfect. As far as we can judge, these praises were strictly just. Of all the poets of the world, of all the illustrious artists of all literatures, Sappho is the one whose every word has a peculiar and unmistakable perfume, a seal of absolute perfection and inimitable grace.
—Symonds.

Saprophyte. See PARASITE.

Sapsucker, the yellow-bellied woodpecker. It is smaller than the robin. Its crown is a bright red, its breast is black with yellow underneath, and the upper parts are black mingled with white and yellow. Because of their boring into maple and other sweet-sapped trees, the sapsuckers are usually considered a pest, but they are also of service in that they are destroyers of harmful insects. They are migratory birds and breed only in the north. They drill less deeply than does the ordinary woodpecker, but they are none the less harmful to the trees.

Saracens, săr'a-sĕns, an Arabic word meaning easterns, orientals. It was applied in the early Middle Ages to the Arabian Mohammedans who had possession of Palestine, and the southern Mediterranean coast. Under them, civilization rose to a very high point, and for four centuries they held the intellectual supremacy of the world. With the appearance of the Seljukian Turks, their power was overthrown, and their civilization disappeared. While the Saracens had encouraged the visits of the pilgrims from the west as a means of revenue, the Turks on capturing Jerusalem, put them to the sword, and thus led to the great crusading movement. See ARABIAN EDUCATION; SALADIN; CRUSADES; HARUN-AL RASCHID; ARABIA.

Saratoga, Battles of, also known as Battles of Freeman's Farm and Bemis Heights, or Battles of Stillwater. Early in the summer of 1777 General Burgoyne started with an army of about 10,000 men from Canada toward Albany, hoping to meet Lord Howe coming up the Hudson and thus cut off New England from the rest of the colonies. St. Leger, commanding the right wing, in an attempt to capture Fort Schuyler, defended by Colonel Gansevoort, met with disaster August 6, when General Herkimer, coming to the relief of the fort, met and practically destroyed a force of tories and Indians under Johnson and Brant at Oriskany, probably the bloodiest battle of the Revolution. On August 16 his left wing, under Baum, was shattered at Bennington by the distinguished Colonel Stark. Burgoyne's main force thus depleted was set upon at Bemis Heights and suffered defeat

September 19, and again October 7 by General Gates, who had succeeded Schuyler in command, though the latter contributed largely to the victory, as did also the intrepid Arnold. These battles were so conclusive that General Burgoyne formally surrendered the remnants of his army, numbering nearly 6,000, on October 17. This succession of victories aroused great enthusiasm throughout the colonies and was largely influential in bringing about France's decision to join them in their struggle for freedom. The far-reaching consequences of this surrender have led to the Battles of Saratoga being considered among the fifteen decisive battles of the world.

See BENNINGTON; BURGOYNE.

Saratoga Springs, N. Y., is one of America's leading summer and health resorts. The city is 39 miles north of Albany, on the Delaware & Hudson and the Boston & Maine railroads, and on the motor trunk line from New York to Montreal. It is easily reached in a short time from Boston, New York and other important Atlantic Coast cities. The city is situated on the most southern spur of the Adirondack Mountains, at an elevation of about 300 feet. There is a large forest nursery under the state conservation commission and the state of New York has established a reservation about the springs and wells, which number about 120, and which include almost every naturally mineralized and carbonated water in the Saratoga region. The most frequently visited springs are the Geyser, Congress, Emperor, Peerless, Lincoln, Coesa and Hawthorne No. 1 and Hawthorne No. 2.

Mineral water is bottled extensively, and manufactures include drugs and medicines, silk gloves and machinery. There are a number of educational institutions, including the Skidmore College, St. Faith's School for girls, five public graded schools and a high school, several private schools, two libraries, and a number of charitable institutions. There are also several parks. The first settlement was made at this place about 1789. Population in 1920, 13,181.

Sardines, sär-denz′, small, delicate fishes of the herring type. They are caught in immense quantities on the coast of Britanny and in the Mediterranean. They are cooked, and packed in olive oil in tin boxes and wooden casks for export. They are laid in together so closely that, "like sardines in a box," has become a proverbial expression. The object of close packing is to economize the oil, which is worth more than the sardines. The name is taken from the island of Sardinia, where they are packed in quantities. Refuse entrails and eggs, bought by the barrel from the herring fishers of Norway and the cod fishers of Newfoundland, are set afloat to attract the sardines. While the sardines are busy with the bait, the fishermen surround them with a long net.

The sardine industry on the coast of France also furnishes employment for a large number of fishermen. The sardines packed in the United States are young herring and menhaden.

Sardinia, an island of Italy. It lies in the Mediterranean Sea, directly south of Corsica, 150 miles distant from the Italian mainland. It is about 160 miles in length and sixty-eight miles wide. In size it is the sixth island of Europe, ranking next to Sicily. Its surface is mountainous. The principal peak attains a height of 6,250 feet. The island is rich in ores of lead, zinc, iron, copper, antimony, arsenic, cobalt, nickel, and silver. There are also coal measures. The mines were worked both by the Carthaginians and the Romans. The island has a rainy winter and a dry summer. It was at one time considered one of the granaries of Europe and furnished Rome great quantities of wheat. Olives, grapes, mulberries, tobacco, almonds, oranges, citrons, madder, and hemp are among the productions. Cork oak, firs, and pines grow on the mountains. Cattle and goats form a considerable source of income. The seacoast villages are engaged largely in fishing, especially for anchovies, sardines, and coral. Wild boars, deer, mountain sheep, foxes, hares, and rabbits are still numerous in the wilder parts of the island. There are a few good roads. Several railways have been constructed. In many respects the inhabitants resemble the Spanish even more than they do the Italians. The present population of the island is about 869,000, being not far from eighty-five to the square mile.

Sardou, sär-dōō (1831-1908), a French dramatist. He was born at Paris. He began to study medicine, but, owing to lack of funds, gave it up and became a tutor, giving instruction in philosophy, mathematics, and history. He soon began writing for periodicals and encyclopedias. His first drama was a failure, but he has since won popularity in comedy and in almost every variety of the drama except tragedy. *Fedora, Théodora, La Tosca,* and *Cleopâtre* were written for Sarah Bernhardt. *Robespierre* was written for Sir Henry Irving. Other titles are *Odette, Madame Sans-Gêne,* and *Marcelle.* Sardou's comedies are full of wit, often taking the form of satire on contemporaneous characters and conditions, and are characterized by variety of action and episode. They have little literary merit.

Sargasso (sär-găs'ō) **Sea,** a huge eddy in the North Atlantic. It reaches in a belt from the Azores to the Bahamas. It has an area equaling that of Europe. A large part of the tract is strewn with a peculiar Gulf weed, really an alga, which is kept afloat by air sacks. It is uncertain whether this alga comes from the coast of Florida and the Bahamas, or whether it is a plant peculiar to the surface of the deep sea. The "weed" is dense enough in places to obstruct the passage of ships. The Sargasso is full of animal life. There are crabs, sea snails, and many smaller marine animals. Certain fishes spawn here. The sailors of Columbus were much frightened, it may be remembered, when they entered the Sargasso Sea. A similar area of weeds exists in the Pacific and still another in the Indian Ocean.

Sargent, sär'jent, **John Singer** (1856), an American painter. He was of American parentage but his birthplace is Florence, Italy. He studied in Italy, France, and Germany, and after traveling for some time in his early youth he became a pupil of Carolus Duran in Paris at the age of eighteen. He was given free opportunity to manifest any artistic ability he might have, and his master, recognizing his latent powers, set him the task of assisting in the decorations of the Luxembourg. Mr. Sargent has painted a number of wonderful figure pieces, the most notable being *Carmencita, Gitano, Hermit* and *Carnation-Lily, Lily Rose.*

His mural decorations in the Boston Public Library, including the noble frieze of the *Hebrew Prophets,* have become famous. Some of Mr. Sargent's finest landscapes are *Cypresses and Pines, Trout Stream in the Tyrol, The Weavers, The Courtyard* and *The Fountain.* In 1917 he was commissioned to paint a portrait of Woodrow Wilson for the National Gallery of Ireland.

Sarsaparilla, a medicine extracted from the roots of several species of smilax, especially the smilax or sarsaparilla plant of South America. The root-stocks are several feet in length but are not larger than a slate pencil. They are imported in bales. Sarsaparilla root may be had in any drug store. Lowell, Massachusetts, is a famous center for the manufacture of the medical tinctures of sarsaparilla. It is a remedy taken internally for rheumatism and diseases of the skin. The "wild sarsaparillas," of American forests are akin to ginseng and spikenard, but are not botanically related to the genuine sarsaparilla. See MEDICINE; DRUGS.

Sarto, Andrea del, än-drā'ä dĕl sär'to (1486-1531), an Italian painter. He was born in Florence, where he lived during the greater part of his life. His name was in reality Andrea Angeli, but as his father was a tailor, the name del Sarto, meaning "of the tailor" came to be applied to the son. He was taught by the best artists of his day, and devoted much time to the study of the great masters, Da Vinci and Michelangelo. He is famous for his frescoes, many of which are in Florence. Among them are the *Madonna del Sacco* in the Church of l'Annunziata, the *Last Supper* at San Salvi, and, in the court of the Servi, the *Nativity of the Virgin,* said to be the finest fresco ever painted. Among del Sarto's other paintings are *Charity,* a *Madonna,* two *Annunciations,* two *Assumptions,* and several *Holy Families.*

Sartor Resartus, sär'tor rē-sär'tus, a satirical work by Thomas Carlyle, published in *Fraser's Magazine* in 1833-34. It appeared in book form in 1835. The title

means "the tailor patched." Carlyle calls the work a "Philosophy of Clothes," but he uses the word "clothes" symbolically. Thoughts and deeds are the clothing of man's spirit. *Sartor Resartus* is divided into three parts, introductory, biographical, and philosophical.

Sartor Resartus, the most original of Carlyle's essays, created an enormous amount of discussion and criticism. So strong are the underlying principles, however, that to this day the book is read by the thoughtful with enjoyment.

It was with the publication of this volume that Carlyle reached the place in American letters which he had long merited. After the almost immediate acceptance of the book by the English reading public, the author removed to London, to commence work on the *French Revolution.*

Saskatchewan, the greatest wheat-producing area in North America, perhaps in the world, is one of the three prairie provinces of Canada. Saskatchewan "number one hard" is nearly as famous a symbol as Kimberley diamonds, Newcastle coals, or Klondike gold. In one banner year, 1915, Saskatchewan's wheat crop was worth more than the entire gold output of the Klondike during its history to that time. The average crop for many years has been well over hundred million bushels, and in bumper years, as in 1922, the crop has been more than two hundred and fifty million bushels.

Location and Area. Saskatchewan is a part of the Canadian Northwest. It lies between Manitoba on the east and Alberta on the west; on the south are Montana and North Dakota, and on the north the Canadian Northwest Territories. The province has no natural boundaries, all its lines being meridians or parallels; eastern boundary, longitude 102°; western, longitude 110°; northern, parallel 60°; southern, parallel 49°. From north to south Saskatchewan is 760 miles long. Its northern boundary has a length of 277 miles, its southern, 393 miles. Its area is 251,700 square miles, or about 3,585 square miles smaller than Alberta. But it is larger than Colorado and Montana combined, larger than either France or Germany, and more than twice as large as the British Isles. Of the total area it is estimated that about 150,000 square miles, or more than 94,000,000 acres, are suitable for agricultural purposes, but only about one-third of that amount has been improved.

Physical Features. Saskatchewan is divided into two main parts by a southward curving diagonal drawn from Fort Chipewyan to a point on the eastern boundary about midway between the Churchill and the Saskatchewan rivers. North of this irregular line the land lies within the Laurentian Plateau, one of the oldest and hardest portions of the earth's surface. Although the rocks of this region have been exposed to weathering influence since very early in the earth's history, there still remain surface inequalities, which were increased by glacial action. Glaciation, too, seems to have removed much of the soil, with the result that much of the region is unfitted for agriculture, although sufficient soil remains to support forest growth.

The southern part of the province belongs to the Great Plains region, which owes its formation partly to pre-glacial flat strata of clays, shales and sandstones which underlie it, and partly to glacial action. As a whole this is a region of rolling prairies, broken here and there by ridges and valleys. The ridges are either surface deposits left by glaciers, or are abrupt bluffs, remainders of an earlier geological formation which has resisted the leveling processes. The valleys cut below the level of the plains are noticeable only when the observer is in their immediate vicinity, and disappear from view at a distance. These valleys are of two types: (1) Those like the Saskatchewan, with headwaters in the Rocky Mountains and with perennial flow, have deep, canyon-like channels in the soft rock strata; (2) streams with headwaters on the plains, and usually an intermittent flow, have shallow valleys. There are also remains of an earlier system of river channels now abandoned or occupied by rivers much too small to explain the size of their valleys, which were cut by streams in ages when this region had a climate much more humid and a precipitation much greater than now. These abandoned river courses

are now often filled at irregular intervals by shallow lakes.

The entire province, except the extreme northern and southern parts, is drained into Hudson Bay, though by widely separated courses. Along the international boundary at the south are a number of small streams which wind a devious course into the upper waters of the Mississippi system, and in the north are several fair-sized rivers which flow into the Athabaska system and thus into the Arctic Ocean. The chief rivers on the Hudson Bay slope are the Churchill, in the north, the Saskatchewan in the center, and the Qu'Appelle in the south. The last joins the Assiniboine, which in turn flows into the Red River and thus into Lake Winnipeg.

Climate. The mean temperature of the province for the year is 36 degrees Fahrenheit. The mean for the growing season (May, June, and July) is about 55. Rain falls principally in these months, and there is little snow; the annual precipitation is about 16 inches, just about the minimum needed to ensure maturity of crops when careful methods of farming are used. A noticeable feature of the climate is the quickness with which warm weather follows winter. Snow usually disappears late in March or early in April, and by the middle of May crops have been seeded. August is the harvest month, and frosts are due in September. The winters are cold, the temperature often dropping to 50 or 60 below zero. But the air is clear and crisp, clouds are all but unknown, and brilliant sunshine floods the land. The extreme dryness characteristic of midsummer also prevails in winter.

Plant and Animal Life. The open prairie regions in the south are covered in summer with wild flowers and native grasses which make excellent hay. Farther north, between the Saskatchewan and the Churchill rivers, are fairly large stands of timber, especially poplar, birch, fir, spruce and hemlock. North of the Churchill only cone-bearing trees are found in any quantity. The forests are the home of many fur-bearing animals, among them the bear, wolf, mink and fox. Game hunting is strictly regulated by the provincial government. Elk, moose and deer still roam in the extreme north, and the pronged antelope is occasionally seen in the southwest. Waterfowl and fish are abundant, but fishing as an industry is still in its infancy, the annual catch being worth about $500,000.

Industries. Saskatchewan leads the Dominion in the production of wheat, is first in horses and second in live stock generally. The oat crop is nearly as large as wheat, while barley, rye and flax are less important. The total value of grains is enough to make agriculture far and away the most important industry. In addition there are various root crops, and, steadily increasing in importance, milk, butter, and eggs. The southern section, where the warm chinook winds modify the winters, is particularly adapted to stock farming.

Manufacturing, relatively a small branch of industry, is forging rapidly ahead. In 1900 the total value of manufactured products was $651,000. By 1910 this figure had increased to $6,332,000, by 1915 to $13,355,000, and in 1917, under the stimulus of war, to $40,657,000. Flour, lumber and lumber products are the most valuable manufactured articles. Latest figures show 2,298 industrial establishments with a product valued at $72,390,348.

Among minerals, gold, silver and petroleum are known to underlie various parts, and gold has been dredged from some river beds. Natural gas is in commercial use at Swift Current. There are large but scattered coal deposits, chiefly in the Souris valley, and deposits have been discovered as far north as Saskatoon. The annual output now approaches half a million tons. Clay of several grades is abundant, and is particularly valuable because the province is almost totally void of building stone.

Government and Education. Except in one important particular, the control of public lands, the government of Saskatchewan is much like that of the other provinces of Canada. In Saskatchewan, as in Alberta, public lands are under the control of the Dominion government. The lieutenant governor is assisted by an executive council, comprising the ministers or heads of departments. The premier is president of the council. A legislative assembly of

63 members (during the World War there were three additional members, representing soldiers overseas), is the legislative branch of the government. The supreme court of the province, consisting of the chief justice and six judges, combines in itself the powers of all the courts of England, but original jurisdiction in many minor civil matters and in criminal cases has been delegated to the district courts. There is also a special surrogate court for the probate of wills. Incorporated cities and towns have justices of the peace and police magistrates. Saskatchewan has universal suffrage; any British subject, male or female, who has resided for twelve months in the province and three months in the electoral district, may vote.

Leading the provoncial education system is the University of Saskatchewan, at Saskatoon, which was established in 1907 and opened to students in 1909. Affiliated with it are a number of denominational colleges, the two provincial normal schools (one at Regina and one at Saskatoon), and various institutes and learned or professional bodies. Attendance at public schools is free and compulsory. Provision was made by the Saskatchewan Act of 1905 for the formulation of separate schools but out of a total of more than 4,000 districts the number of separate schools, both Roman Catholic and Protestant, is less than 25. The general direction of all schools, including high schools and collegiate institutes, is under the minister of education. The provincial government makes grants of funds to aid districts in supporting high schools as well as elementary schools.

The People. In 1901 Saskatchewan had a population of 91,000 people. There were no cities, and only 7 towns and 28 villages. More than 77,000 people lived in rural districts. In five years the population increased nearly threefold, to 257,763 and between 1906 and 1911 the total almost doubled again. In 1921 the census showed 757,510, a little more than eight times the figure for 1901. Of this total 98,000, or more than the entire population in 1901, lived in cities, while the total urban population was 218,958. This was about 29 per cent of the population. The largest cities in order, were Regina, the capital, 34,432, Saskatoon, 25,739, Moosejaw, 19,285, and Prince Albert, 7,558. Approximately one-half of the people are of British birth or descent, about one-fifth have come from the United States, and the balance from various European countries, Ruthenians, Poles and Germans being most numerous. Saskatchewan has received an average of about 12 per cent of the total immigration to Canada since 1906.

History. Saskatchewan's history is relatively brief, for it is only since 1905 that the province has existed. The name Saskatchewan, however, dates back long before the days of white occupation; it is a corruption of a Cree Indian word meaning "swift current" or "rapid river". Originally the Indians applied it to any river, but gradually they seem to have restricted it to the one great river of the fertile prairie belt. Later the name was given to one of the territories or districts into which the Northwest Territories was divided after this vast section was transferred from the Hudson's Bay Company to the Dominion government. The transfer took place in 1870, but the districts of Saskatchewan, Alberta, Athabaska and Assiniboia were not erected until twelve years later.

The formation of these definite units was a symptom of the encroachment of the white settlers upon lands claimed by Indians and half-breeds. Perhaps even more than the actual encroachment, the manner in which the latter were being hemmed in and restricted led to armed rebellion in 1885. The Saskatchewan Rebellion, as it is called, was headed by the same Louis Riel who had led the revolt in Manitoba in 1870. The métis, or half-breeds, realizing the difficulties of their position, called on Riel, who was at the time living in Montana, to help them maintain their rights. In March, 1885, Riel was elected president of the provisional government established by the métis at St. Laurent. At first there was some hope that both sides would be moderate and that the Dominion government would make concessions, but before any decision was reached there was an unfortunate skirmish at Duck Lake between a detachment of Mounted Police

and a band of métis. Immediately followed a rising of the Crees, led by Big Bear. They attacked a little settlement at Frog Lake, killed the men, and carried off the women and children. News of this outbreak caused great excitement in eastern Canada, but because of transportation conditions it was two months before Canadian troops were on the scene, and then a considerable part of their journey had to be by rail through United States territory. General Middleton commanded the 4,000 men in the expedition, which was completely successful, both in breaking up the Indian bands and in capturing Riel.

Insignificant though it was from a military point of view, the Saskatchewan Rebellion had important results. It did lead the government to recognize the rights of the métis, and to give them deeds to their lands. The Northwest Territories, too, in view of their importance, were given representation in the Dominion Parliament. Most important of all, perhaps, was the evidence it gave of the reality of confederation. and the stimulus it was to the national spirit. Coming in the same year as the completion of the Canadian Pacific Railway, it marks the end of the period of pioneering.

Thereafter the history of Saskatchewan is a record of orderly political and economic development. Population began to increase at a more rapid rate. More settlers meant a demand for a stronger voice in government, as a result of which the Northwest Territories in 1888 were given a legislature. Then in 1890 the legislature was given control of all territorial expenditures, and finally in 1897 the executive council was made responsible to the legislature. The last step was the organization in 1905 of two provinces, Alberta and Saskatchewan, out of the four territorial districts. With trifling boundary changes, the new province of Saskatchewan swallowed up the old districts of Assiniboia, Saskatchewan, and the east half of Athabaska.

The first ministry was formed by Walter Scott, a Regina newspaper owner and editor, who was also a member of the Dominion House of Commons. In 1916, after eleven years in office, ill health compelled him to retire. The last years of his term of office were marked by temperance agitation, which was finally successful in 1915, as matters of war policy, however, rather than on moral grounds. Scott's successor, W. M. Martin, was also a Liberal; he remained in office until 1922, when he was succeeded by Charles A. Dunning.

STATISTICS:

Area, square miles	251,700
Forest reserves, square miles	10,000
Population (1921)	757,510
Representatives in Dominion House of Commons	16
Dominion Senators	5
Greatest wheat crop (1922), bushels	250,167,000
Oats, 1922 yield, bushels	179,708,000
Potatoes, bushels	4,012,000
Hay and clover, tons	374,000
Flax, bushels	4,079,000
Horses	1,152,000
Cattle	1,563,000
Total mineral output, value	$1,114,220
Total mineral output, value	$2,000,000
Miles of steam railway	6,200
Telephone lines (all government owned), miles	33,213

Saskatchewan Rebellion, the second and last rebellion of the half-breeds (métis) led by Louis Riel; (see RIEL, LOUIS; RED RIVER REBELLION). After the first rebellion was suppressed the half-breeds were given 240 acres of land each; but they were not pleased with contact with the all-white settlers in Manitoba and especially in the Red River Valley. They gradually drifted westward, settling along the Saskatchewan River. Here too they were disturbed; the whites were encroaching, the Canadian Pacific Railroad was building toward their country, and the herds of buffalo—their chief food supply—were disappearing. They had no titles to the land they held; and, as when on the Red River, they were displeased with the elimination of the French system of having all farms touch the river, running back from the water's edge in narrow strips.

Louis Riel, who headed the first rebellion until opposed, was at this time (1884) living in Montana. He was sent for. In March, 1885, Riel set up a provisional government, made what seemed to be moderate, reasonable demands on the Canadian government, and would perhaps have been successful had not an unfortunate encounter between a band of métis and a Mounted

Police unit occurred on Duck Lake. The Cree Indians, friends of the métis, led by Big Bear, took up arms and massacred the men and captured the women and children of a village on Frog Lake.

Eastern Canada was aroused; a force of 4,500 men under General Middleton was organized. The contingent was split into three columns; one under General Middleton marched from Qu Appelle toward Batocke; one under Colonel W. D. Otter advanced from Swift Current toward Battleford; while the third, headed by General Strange, left Calgary and moved toward Edmonton. Riel was captured by General Middleton's men, three days after his defeat, at Fish Creek; Big Bear and his Cree followers were put to rout; and another Cree chief, Poundmaker, surrendered. Riel was tried and hanged at Regina, and Poundmaker was imprisoned.

As a result of this outbreak the half-breeds were given titles to their land; the Northwest Territories were given Parliamentary representation; and the Canadian national spirit became a distinct force in Canadian life.

Saskatchewan River, a river of western Canada. Together with the Nelson River, the Saskatchewan forms the greatest river system that pours its waters into the Hudson Bay. This river is one of four large streams that are east of the continental divide of North America, the remaining three being the Mississippi, the Saint Lawrence and the Mackenzie. Saskatchewan River is formed from North and South Saskatchewan, which unite at Prince Albert in Saskatchewan Province, thence it flows eastward to Lake Winnipeg.

The main portion of the river is estimated at 240 miles in length. It has its rise in the glacier-like Mount Hooker, situated in the Alberta Rocky Mountains. The Northern branch of the Saskatchewan is 760 miles long, and is said to drain an area of 60,000 square miles.

The opposite branch of the river, called the South Saskatchewan, has several head streams, the most important of which is called the Bow. This has its source in the Rockies west of Calgary, and later unites with the Belly River.

The length of the South Saskatchewan is 865 miles, and it drains over 65,500 square miles. Although the waters of the south branch are not as important as the North Saskatchewan as far as river travel is concerned, it is of great value for the purpose of irrigation, as its clear water spreads over the surrounding territory and promotes the productivity of the soil to a large degree.

Just a short distance before the Saskatchewan proper flows into Lake Winnipeg, it passes through several lovely lakes, including Cedar Lake. From this point till it reaches the mouth, the river is interrupted by many rapids, but in the western part the river is navigable.

River steamers of various sizes traverse the waters at intervals. They rarely, however, go any farther than the junction of the north and south branches. "Saskatchewan" means "rapid-flowing river."

Saskatoon, Saskatchewan, 160 miles north of Regina, a distributing point for nearly 50,000 square miles of territory. Its industries include grain elevators, flour and oatmeal mills, and over 200 wholesale houses. It has electric light, power, and water plants and a sewerage system, and its street railways are municipally owned. It is the seat of the provincial university and agricultural college. Population, 1921, 25,739.

Sassafras, an American tree of the laurel family. It is akin to the red bay and benzoin bush. It grows in rich woods from Massachusetts to Kansas and south to the Gulf. Its spicy, aromatic bark is used as a medicine and is chewed by boys like slippery elm bark. An extract affords a favorite flavor for summer drinks. Sidney Lanier represents the sassafras and the persimmon combining to retake possession of old fields in the South.

I wander to the zigzag-cornered fence
Where sassafras, intrenched in brambles dense,
Contests with stolid vehemence
The march of culture, setting limb and thorn
As pikes against the army of the corn.
—Sidney Lanier, *Corn.*

Satan, the name applied to the personification of an evil power opposed to God; the great adversary of man; the devil. Satan is mentioned but three times in the

Old Testament, once each in the books of Job, Chronicles, and Zachariah. In fact the doctrine of one who works evil in opposition to the Lord, or the doer of good, is not taught by the Old Testament. The Old Testament Hebrew doctrine of Jehovah as given in the book of Isaiah is as follows:

There is none beside me. I am the Lord and there is none else. I form the light, and create darkness; I make peace, and create evil; I the Lord do all things.

The doctrine of Satan as an evil power contending with the power of good finds its counterpart in the theologies of Babylon, Persia, and other eastern nations, where a plurality of supernatural powers was an article of belief. The Anglo-Saxon race inherited from ancient sources, no doubt, a similar belief in adverse powers,—"For Satan finds some mischief still for idle hands to do." The Satan of the New Testament, who tempted Christ, and the Satan of Milton's *Paradise Lost,* who was cast out of heaven, appear to be modern ideas for which little foundation is laid in the Old Testament.

High on a throne of royal state, which far
Outshone the wealth of Ormus and of Ind,
Or where the gorgeous East with richest hand
Showers on her kings barbaric pearl and gold,
Satan exalted sat, by merit rais'd
To that bad eminence.

—Milton, *Paradise Lost.*

Sateen, săt-tēn′, a fine, soft, twilled cotton fabric of glossy surface. Sateen is used for women's waists and dresses, men's shirts, for underwear and linings, in the manufacture of corsets, and for many other purposes. It is bleached pure white, or dyed in black or plain colors, and printed in a variety of designs.

Satellite, săt′ĕl-līt, in astronomy, a heavenly body that revolves about a planet. The moon is a satellite of the earth. So far as observed, Neptune has one satellite; Uranus, four; Saturn, eight; Jupiter, five; Mars, two; and the earth, one. Saturn is surrounded by bands thought to be composed of countless numbers of minute satellites. In literature, a satellite is a person of little importance who hovers about another, as an attendant or obsequious follower. See Pythagoras; Ptolemy.

Satin, a strong silken fabric of high luster and smooth surface. The beauty of satin depends partly on the quality of the material used in its manufacture, but the distinguishing feature is what is called the "satin weave." In plain weaving, each weft thread passes under one warp thread, over the next, and so on under one and over one. In satin weaving, a weft thread passes over a warp, under eight (or more), over one, under eight, and so on. Moreover, the weft does not pass over the single warp at regular intervals, but irregularly. This brings the warp threads, which are of fine silk, to the surface, and almost entirely conceals the weft. Satin is woven with its face down, as this makes necessary the lifting of fewer warp threads. The cheaper satins have cotton wefts; the better grades are entirely of silk. Satin is finished by passing the face of the fabric over heated metal cylinders, which removes the minute fibrous ends that are noticeable when the cloth leaves the loom. As in twill weaving, the number of warps skipped by the weft is used to designate the quality of the satin. When eight warps are skipped to one tied down, the product is called "eight-leaf" satin or eight-leaf twill. Rich satins are sometimes sixteen-leaf or twenty-leaf twill. See Twill; Weaving.

Satire. See Humor.

Saturday, the seventh day of the week. It receives its name from the planet Saturn. In the Roman Catholic breviary it is known as the Dies Sabbati, and it is the Sabbath of the Jews.

Saturn, an ancient divinity of the Romans, identified at an early date with Kronus or Chronus of the Greeks, with whom, however, he had little in common. Saturn was believed to have appeared in Italy during the reign of Janus, and was the god who led the Romans out of the chaos of barbarism into civilization by interesting the people in the arts of husbandry and gardening. Harvest-home festivals, called Saturnalia, held in December in honor of Saturn, were scenes of rustic revelry and mirth. Later, the Saturnalia became noted as seasons of general debauch, and the term is now one of reproach. As compared with lively, quick Mercury, Saturn was dull and phlegmatic. A saturnine face, therefore, is one adjudged gloomy, dull, sluggish, or uninteresting. Saturday or Saturn's day is

named in honor of this divinity. See CRONUS.

Saturn, the most remote of the planets known to the ancients. Its orbit is outside of that of Jupiter. Its distance from the sun is 9½, its surface 84, its volume 768, its diameter 9, its mass 95 times that of the earth. A mass of 100 on the earth would weigh about 120 on the surface of Saturn. Its day is ten hours and fourteen seconds in length, giving a high rotary velocity. Its density is only two-thirds that of water, indicating in part, at least, a gaseous condition. The most remarkable feature of Saturn is that it is surrounded by three enormous whirling rings with a common center, that is to say, one outside of another, as though they had been cut from one sheet of material fifty miles in thickness. These rings are apparently made up of a swarm of small particles, possibly no larger than those of a dust storm. It is known that Saturn has ten satellites, the last of which was discovered in 1905. The last has also been found to be the smallest. It has been suggested by astronomers that the rings of Saturn may some day form additional satellites. See PLANETS; ASTRONOMY.

Saturnalia. See SATURN (Roman God).

Saturnia, an ancient name of Italy, having reference to the mythological belief that the god, Saturn, ruled in Italy and taught the arts of agriculture and of civilization to its people.

Satyrs, săt′ers, in Greek mythology, deities of the wood and field, supposed to be descendants of Hermes. The satyrs represent the luxuriant forces of nature, and appear in art as of vigorous frame, with bristly hair, and somewhat animal-like features. Often they are represented with horns and tail and with large, pointed ears. Hesiod mentions them as a worthless race, unfitted for labor. They were followers of Pan, and, as such, were fond of wine and of the dance. They were dreaded by mortals as were all sylvan deities. The *Satyr* of Praxiteles, representing a beautiful and graceful youth, is one of the most famous specimens of Greek sculpture. The Romans confounded the satyrs with their fauns and represented them as having the feet and legs of goats. See SILENUS.

Sauerkraut. See CABBAGE.

Saul (1055-1033 B. C.), the first king of the Hebrews. He was of the tribe of Benjamin. Historically, he was, without doubt, a brave leader of the Israelites against the Philistines, Amalekites, and other surrounding nations. He was sorely wounded in the battle against the Philistines on Mount Gilboa. Rather than meet death at the enemy's hand, he fell on his own sword. The Scriptural account of his coronation, his leadership of Israel, and his jealousy of David may be read in the First Book of Samuel. See DAVID.

Sault Sainte Marie, soo sānt mā′rĭ, the Falls of the St. Mary. The name is French. Sault is the same word we have in somer*sault,* meaning leap. It has no possible connection with Sioux, and should of right be pronounced "so," not "soo." The falls in question are in the Ste. Marie River between Lakes Superior and Huron. The difference between the levels of the two lakes is about twenty feet. A town of the name has grown up on the Canadian shore and another on the American, with a combined population of 27,000. The Canadian Pacific Railway here connects with the Duluth-South Shore and with the "Soo" Railway. The State of Michigan began a canal in 1853 which was subsequently taken over by the United States government. It is known as the Weitzel lock. It is 515 feet long, 80 feet wide and has 17 feet of water on the mitre sills. In 1896 the Poe lock, north of the Weitzel, was completed. It is 800 feet long, 100 feet wide and has 22 feet of water on its sills. The increase in traffic called for still more locks, and in 1908 the construction of the Davis Lock, north of the Poe lock, was ordered. This was completed in 1914. It is 1,350 feet long, 80 feet wide and has 24½ feet of water on its sills. Before the Davis lock was completed another of equal dimension was ordered constructed north of it. This was completed in 1918. On the Canadian side there is a lock 900 feet long, 150 feet wide and 23 feet deep. The tonnage surpasses that of the Suez Canal. Over 25,000 vessels pass through the locks in a season, which is about 250 days.

The following table shows the movement of traffic from 1900:

1900	25,643,073

1901	28,403,065
1902	35,961,146
1903	34,674,437
1904	31,546,106
1905	44,270,680
1906	51,751,080
1907	58,217,214
1908	41,390,557
1909	57,895,149
1910	62,363,218
1911	53,477,216
1912	72,472,676
1913	79,718,344
1914	55,369,934
1915	71,290,304
1916	91,888,219
1917	89,813,818
1918	85,680,327
1919	68,235,542
1921	48,259,254
1920	79,282,496

Sault Sainte Marie, Mich., a port of entry and the county seat of Chippewa County, is on the Sainte Mary River, near the outlet of Lake Superior, and on the Sault Sainte Marie Ship Canal. It is served by several railroads, and the international bridge across the Sainte Mary River connects with Sault Sainte Marie, Canada, giving direct connection with the Canadian Pacific Railroad. This romantic spot is known to have been visited as early as 1634, at which time about 2,000 Indians were living here. It was a favorite fishing ground of the Chippewas. In 1641, the Jesuit Fathers Raymboult and Jogues visited this locality, and in 1668 Father Marquette established here the mission that was the germ of the first permanent settlement within the present limits of Michigan. In 1671, the French convoked here a great council of the Indian nations, and took formal possession, by proclamation, of almost all of the present western United States.

Splendid hydro-electric power is an aid in the manufacture here of carbide, lumber, dredging machinery, leather and woolen goods. The city contains Loretto Academy, a high school and graded schools, a business college and a library. Population in 1920, 12,096.

Sault Sainte Marie, Ontario, is on the Saint Marys River, opposite the Michigan city of the same name, and is on the Canadian Pacific and Algoma Central & Hudson Bay railroads. It is 350 miles north of Detroit, Mich., and 440 miles northwest of Toronto. Regular steamer service is maintained between Sault Sainte Marie and all important ports on the Great Lakes.

The city has an extensive water trade in ore, lumber and grain, and has manufactories of steel, paper and pulp, railway cars, chemicals, machine shop and foundry products, wooden ware, stump pullers, snowshoes, brewery products and numerous other commodities.

Interesting features of Sault Sainte Marie are the court house, two libraries, public graded, high, separate and technical schools and a collegiate institute, theaters, several modern hotels, sixteen churches and a number of attractive parks. In 1921 the population was 14,887.

Sausage, a food composed of minced meat, well seasoned and generally encased in the prepared intestines of some animal. Far back in history this article of diet seems to have been highly esteemed. The ancient Romans combined fresh pork, bacan, and the nuts of the stone pine with many herbs and much seasoning. The Italians of today eat a bologna consisting of chopped veal, salt beef and pork, bacon, herbs, etc. The smoked sausages of Germany are enjoyed by many both in America and the Fatherland. As to the pork sausages of our country, the old fashioned country product is best relished. Fresh pork finely minced and seasoned with salt, pepper, sage, garlic, etc., according to taste, form its proper constituents. It is sometimes smoked but always must be well-cooked before ready for the table. The commercial article of today varies somewhat in description, being often composed of inferior meats or trimmings of almost any meat, further compounded with flour, potatoes, and water.

Savannah, the chief seaport of Georgia, is situated on the Savannah River, about fifteen miles from the ocean. The city has a total water frontage of six miles. It was settled by Oglethorpe in 1733. It repelled an attack of the British in 1776, but was taken by them two years later. During the Civil War it was an important center of supplies for the Confederate army. Sherman's famous march to the sea, December

21, 1864, terminated with the capture of the city. In addition to steamship connections with the Atlantic ports, Savannah is the terminus of several lines of railway.

The city has many creditable public buildings and has an excellent climate all the year round. Since the Civil War it has become a manufacturing center of no little importance. There are oil mills, sugar refineries, sawmills, sash and door factories, and flour mills on an extensive scale. The manufacture of artificial ice is an important industry. It is a large market for naval stores; immense quantities of tar, pitch and turpentine are shipped. It is also the greatest cotton port on the Atlantic coast. Rice, lumber, tobacco and fertilizers are important exports. In 1920 the population was 83,252. See OGLETHORPE; GEORGIA.

Savannah, a river which forms the boundary between Georgia and South Carolina. Its source is in the Blue Ridge Mountains, from which it flows southeast, and enters the Atlantic Ocean after a course of about 450 miles. It has a rapid upper course, and as it travels, it deposits a large supply of silt. It has three main tributaries, the Tallulah, Seneca, and Broad rivers. The river is navigable as far as Augusta, Georgia.

Save, a river which branches off from the Danube. Its source is in the northwestern part of the Austrian Crownland of Carniola, from which it flows through Croatia and along the borders of Slavonia, and forms a pass from Bosnia and Servia until it again joins the Danube at Belgrade. To this point the river is estimated to be 500 miles in length.

The Save is navigable for steamers for a distance of about 370 miles, as far as Sissek. Its principal tributaries include the Kulpa, Unna, Vrbas, Bosna and Drina. These it receives from the right, although there are a few small rivers on the left.

Savigny, Friedrich Karl von (1779-1861), a celebrated German jurist, founder of the modern historical school of jurisprudence. After receiving an education, at Marburg, he taught there for several years, and later at Berlin and Landshut. In 1842 he gave up pedagogy, and entered the Prussian Ministry, where he prepared documents for presentation. After a creditable career, he retired from politics in 1848, when he began to write treatises on subjects of legal and political interest. In 1803 he published the *Law of Possession,* which established his reputation as an authority.

Saville, Marshall Howard (1867-), an American archaeologist, was born at Rockport, Mass., and educated at Harvard University. Later he engaged in field work under Professor F. W. Putnam, when he made many important discoveries in southern Ohio. In 1803 he became professor of American Archaeology at Columbia University, and later director of the Museum of the American Indian. Dr. Saville engineered many explorations in Ecuador, Columbia, Honduras, Mexico and Yucatan, these leading in most cases to important discoveries.

Savings Banks, institutions that receive small deposits and allow compound interest on them. They flourish chiefly in industrial cities where they perform a great service by caring for the many small savings of wage earners. In addition to regular banks that pay interest on deposits, there are about 1,600 savings banks in the United States with savings deposits aggregating almost $6,020,000,000. They are operated under state laws intended to guard the interests of depositors. Among other customary provisions is one authorizing the banks to require reasonable notice of intended withdrawal of deposits. This feature is designed to prevent the hasty withdrawal of funds by reason of an unreasonable panic. Savings banks are usually ready to pay on demand, but, without such provision as that named, the banks would be unable to loan to borrowers and could not afford to pay interest on deposits. In 1910 Congress made an appropriation for the establishment of postal savings banks.

Germany claims credit for the origin of savings banks. The first savings bank in Europe was established at Brunswick in 1765. A savings bank established at Hamburg in 1778 still exists. Others followed. In Great Britain as early as 1697 De Foe suggested the need of such an institution. The idea of "frugality banks" was revived in 1797. Two years later the first British

savings bank was actually established. By the middle of the nineteenth century the deposits in British savings banks had grown to $1,500,000. In 1861 savings departments were opened in connection with British postoffices. Extensive systems of savings banks under private management exist in the English colonies and in the countries of continental Europe. In France a supplementary system is operated through the postoffices and schools. School savings banks were established in the United States in 1885, and through them pupils of the public schools have saved millions of dollars. See POSTAL SAVINGS BANK.

Savonarola, sä-vo-nä-rō′lä (1452-1498), an Italian ecclesiastic, statesman, and reformer. He is considered by some a forerunner of the Reformation. The best informed writers say, however, that he was merely a reformer, and that he never lost faith in the doctrines or organization of the Catholic church. He was a native of Ferrara, Italy. He was a grave, precocious child with a fondness for books. His parents educated him for the practice of medicine. A disappointment in love, together with a natural bent for serious matters, caused him to leave his studies and home and to enroll himself in a monastery of St. Dominic at Bologna. After various missions, he was sent to the Dominican monastery in Florence, where he won by degrees a reputation as a preacher.

His spirit was weighed down with the ribald songs of the streets and the general laxness of morals. He developed wonderful power as a pulpit orator. He shook men's souls by his terrible threats of the wrath to come, and drew tears from their eyes by the tender pathos of his assurances of divine mercy. In 1491, just a year before the discovery of America, he was elected prior of the Convent of St. Mark's. Lorenzo de Medici, the Magnificent, was at the height of his popularity. Savonarola attacked him bitterly on the score of an immoral influence. Lorenzo tried at first to appease the monk, but without avail. On his death bed, however, he sent for Savonarola to absolve him. The priest is said to have laid down three conditions. First, "You must repent and feel true faith in God's mercy." Lorenzo assented. Second, "You must give up your ill-gotten wealth." This Lorenzo promised to do. Third, "You must restore the liberties of Florence." At this Lorenzo turned his face to the wall without reply. Savonarola left, Lorenzo died unabsolved.

Compressing the work of a lifetime into a few lines, it may be said that Savonarola drove the Medici out of Florence, established a republican form of government, and was for a few years, by virtue of his prominent position in the church, practically dictator of Florence. He turned the gay, licentious city into a Puritan commonwealth. Cards and other means of amusement were barred. The city was searched from garret to cellar for licentious literature and indecent pictures, and the churches were filled with penitents. The witty, changeable citizens of Florence, accustomed to gaiety were not, however, made of stuff like the followers of Cromwell and the founders of New England. A reaction came. Complaint was rife. Savonarola, unwisely it would seem, began to attack certain practices of the papal court. He was excommunicated. The city of Florence was warned not to harbor him under penalty of being placed under a ban. Within a few months the former all-powerful leader of the people was tried for heresy, convicted, put to the torture, hanged, burned at the stake, and his ashes scattered to the four winds. He was a man of wonderful power and intellectuality, a sincere patriot, and an incorruptible churchman. His career is one of the strangest recorded on the pages of Italian history. George Eliot has drawn Savonarola with a master hand in her powerful novel, *Romola.*

See MEDICI; FLORENCE.

Saw, a well known mechanic's tool. The modern saw consists of a steel blade provided with V-shaped or W-shaped teeth. The carpenter's saw is used in joinery, the buck-saw for cutting fuel, the cross-cut for timbers, the surgeon's saw for amputating limbs, etc. "Sawbones" is a popular nickname for a surgeon. The term buzz-saw was applied first to a small circular saw used by watchmakers and others to cut metal. Quarrymen use saws in cutting blocks of marble and limestone. The builders of the Egyptian pyramids sawed out granite

blocks with bronze saws set with jeweled teeth. The earliest prehistoric saws known have wooden blades in which flakes of flint are set for teeth by means of bitumen.

The saws used in sawmills are of three forms, the drag saw, which is pushed to and fro; the circular saw, the whirling edge of which strikes the wood; and the band saw. The latter is a vertical ribbon of metal running over pulleys like a belt. It is made of finely tempered steel and may be made so thin that far less of the log is wasted in sawdust than when cut with a saw of another pattern. The gang saw consists of a number of blades operated in a single frame, so as to cut an entire log into boards at one operation. The circular saw dates from 1790. The band saw was invented a half century later. For all saws, it is necessary to set the teeth, that is, to bend half the teeth slightly to one side and half to the other in order to make a cut slightly wider than the blade is thick. The greener the timber, the more set the saw requires. The surgeon's saw is without set and the blade tapers gradually—grows thinner—toward the back. In 1919 there were one hundred and twelve saw-making factories in the United States turning out an annual production valued at $31,460,557.

It is interesting to know that the name, "Sierra," applied to numerous mountain chains, is a Spanish word meaning "saw," having reference to the notched or tooth-like appearance of the mountain chains.

Sawfish, a species of fish found in almost all seas, so called from a peculiar elongation of the snout. This "saw" is a flat blade of bone like a sword blade, with a row of tooth-like projections on each edge. These vary in number. They are set firmly into the bone, and so furnish a formidable weapon for the owner. The fish makes good use of this saw by charging into a school of fishes and slaying about him right and left, so killing and wounding numbers of them for food. The sawfish is from ten to twenty feet long, including the saw, which forms about one-fourth the length. It is dark-gray above, ashen on the sides and white beneath. Its scales are very tiny. They have been known to kill whales by plunging the saw into the whale's body.

Sawfly, an insect related to the bee, the ant, and the wasp, but more closely to the ichneumon fly. Instead of a boring, drill-like ovipositor like that of the ichneumon fly, the sawfly has a pair of notched blades with which it saws a notch in the edge of a green leaf or stem in which to place its eggs. There are many kinds of sawflies. Three of the more common deposit their eggs in the leaves of the rose, the pear tree, and the currant. When partially developed the larvae frequently spin webs within which they shelter themselves. The sawflies themselves do little damage, but their larvae are a pest in the flower and vegetable garden.

Saxe, John Godfrey (1816-1887), an American poet. He was a native of Vermont and was educated at Middlebury College. He studied law and in 1856 was made attorney-general of Vermont. He edited the *Sentinel* at Burlington, Vermont, and later the *Evening Journal* at Albany. He was well known as a lecturer and as a writer of humorous verse, much of which was published in current periodicals. His published books include *Humorous and Satirical Poems, Fables and Legends of Many Countries, The Masquerade and Other Poems,* and *The Money King and Other Poems.*

Saxe Holm Stories, a series of tales published in 1874 and in 1878 in *Scribner's Monthly.* They appeared under the pseudonym of Saxe Holm, and, although the authorship has never been acknowledged, it is believed commonly that they were written by Helen Hunt Jackson.

Saxifrage, săks'ĭ-frāj, a family of plants, in systematic botany placed usually next to the rose family. Its members are widely distributed throughout temperate latitudes. It includes currants, gooseberries, bishop's cap, grass of Parnassus, hydrangeas, and other well known plants.

Saxony, before the World War a kingdom of the German Empire, now a state of the German Republic. It lies to the south of Prussia. Area 5,787 square miles, about that of Connecticut and Rhode Island combined. The surface, on the whole, is rough and rolling, with level tracts in the west. The Elbe is the principal river. "Saxon Switzerland," in the southeastern part of

the state, is a region of scenic beauty. The entire area of Saxony is either in timber, field, pasture, or meadow, or it is occupied by mines and towns. The farming people live in villages. Scattered farmhouses are unknown. The grains and vegetables are those raised in the northern half of the United States, save that the summers are too cool for Indian corn. In proportion to its area, Saxony is the leading manufacturing state in Germany. Weaving, mining, and metal work are the leading industries. In all, 150 mines are in operation. The principal ores of Saxony are silver, lead, tin, cobalt, and iron. Coal is found near Dresden. Peat is abundant. Meissen-on-the-Elbe, is noted for the manufacture of Dresden china; Chemnitz, for the manufacture of machinery; Freiberg, for smelting and foundry work; Leipsic, for its university and trade in furs and books. Dresden, the capital, is noted as an art center.

The name Saxony is derived from the Saxons, a Teutonic race of central Europe. At one time Saxony was the most powerful dukedom in northern Germany. Frederick the Wise, who ruled 1486-1525, was, it may be remembered, the protector of Luther, the political promoter of the Reformation. During the Napoleonic wars, Saxony made the mistake of siding with France against its neighbors. After the battle of Waterloo large slices of territory were cut off in favor of Prussia. In 1866 Saxony made another mistake in siding with Austria against Prussia. A large indemnity was exacted by Prussia as a condition of independence. When the new German emperor was elected, the seat of the imperial court of justice was fixed at Leipsic.

Scale Insects, small, flattened bugs. The females are wingless, and are protected by a scale-like covering produced from a wax of the body which hardens on exposure to the air. In place of a scale, the wax of many species, called mealy bugs, takes the form of grains or powder. Nearly every fruit has its corresponding scale insect. The San José scale, the dreaded pest of California fruit growers, is capable of rearing 2,500 adults a season. See article on SPRAYING for means of holding scale insects in check. The orange and lemon growers of California and not infrequently of Florida inclose their trees one by one in a light, gas-tight tent, and fumigate with a poisonous gas. Sprays of whale oil soap, and crude petroleum are effective. Scale insects cannot fly, but they spread by clinging to young trees from the nursery. In some states all nursery stock is required by law to be fumigated before it is shipped. Scale insects damage fruit to the extent of millions of dollars annually. There is no prospect of their extermination. However, science has won a notable victory over the cottony-cushion scale. This insect was introduced from Australia on nursery stock and soon overran orange and lemon trees to the utter dismay of fruit growers. On investigation it was found that it is held in check in its native home by a lady-bug beetle. A colony of these beetles was turned loose in California and throve wonderfully on the scale insect until the dangerous pest is now practically extinct. The lady-bug no longer having food to live on has gone with it. See SAN JOSÉ SCALE.

Scandinavian Languages. See LANGUAGE.

Scandinavian Peninsula. See NORWAY; SWEDEN.

Scapegoat, in the ancient Jewish ritual, a goat loaded with the sins of the people and sent away into the wilderness. After the Hebrews settled in Jerusalem the scapegoat was driven over a precipice about twelve miles from the city. In Leviticus xvi: 21, 22, it is said:

> And Aaron shall lay both his hands upon the head of the live goat and confess over him all the iniquities of the children of Israel . . . and shall send him away by the hand of a fit man into the wilderness, and the goat shall bear upon him all their iniquities into a land not inhabited.

In literature, the term scapegoat is applied to anyone who is made to bear the blame for the wrong-doings of others.

Scarabaeus, skăr-a-bē′ŭs, a tumblebug held sacred by the Egyptians. None might injure it. In the ball of dung which the beetle rolls from morn till night, the Egyptians are said to have recognized an emblem of the globe. If this be true, their ideas of the shape of the world were centuries in advance of Christian Europe. The beetle itself personified the sun, the sharp projec-

AMONG THE PEASANTRY OF THE SCANDINAVIAN PENINSULA

1. Before a Farm-House, Dalarne, Sweden
2. A Peasant of Thelemarken District, Norway
3. In a Farm-Yard, Lerdal, Sweden
4. A Girl of Hardanger, Norway
5. Peasant Women, Hardanger

tions on the head being rays of light and the thirty segments of its six feet (*tarsi*) represented the thirty days of the month. In hieroglyphics, a picture of the scarabaeus was used to represent the verb to be. Its figure was imitated in sculpture and its dead body was hung about the neck as an ornament.

Scarlet Fever, an acute contagious disease. It is somewhat akin to measles, and, like measles, is peculiar to children, because a first attack protects from a second. The cause is not positively known, but it is due doubtless to a specific organism, that is to say, a minute plant or animal multiplying in the system. It is considered much more dangerous than measles. Especial care should be taken lest the patient take a cold. The hearing of many patients who recover otherwise is permanently injured.

While the organism causing scarlet fever has not been identified, physicians are now able to control the disease in most cases, if treatment begins in its early stages, and fatalities are much less frequent than formerly.

Scarlet Letter, The, a novel by Nathaniel Hawthorne, published in 1850. The scene is laid in Boston about the middle of the seventeenth century, and depicts with marvelous intensity, the effects of sin and of the punishment of sin upon two wholly different natures. The story made its author, then forty-five years of age, famous. It is unquestionably the most powerful of Hawthorne's works, and as a piece of imaginative prose is unequaled.

Schaeffer, Nathan (1849-1919), an American educator and author, was born in Berks County, Pa. After graduation from Franklin and Marshall College in 1867, he studied in Leipsic, Berlin and Tubingen. After his return to America, Dr. Schaeffer taught for a time at Franklin and Marshall College. In 1877 he was appointed principal of the Keystone State Normal School, and in 1893 was chosen superintendent of public instruction in Pennsylvania. In this position Dr. Schaeffer succeeded in placing Pennsylvania in a prominent position in educational matters. He was a regular contributor to educational and theological journals, and was prominent in educational circles as an editor and author. From 1893 until his death he edited the *Pennsylvania School Journal.* The most important of his published works are *Thinking and Learning to Think* and a *History of Education in Pennsylvania.*

Schaffhausen, shäf-how′zen, a city of Switzerland, the capital of a canton of the same name. It is situated on an eminence overhanging the Rhine. The population is about 15,000. There are manufactures of cotton and woolen goods and carriages, as well as distilleries, breweries, and other industries. The city is celebrated for its quaint architecture. A massive cathedral of the basilica pattern, dating from 1052, contains a celebrated parish bell bearing the date of 1486. It bears the following inscription: *"Vivos voco; mortuos plango; fulgura frango"* (I call the living; I lament the dead; I rend the lightning). The latter phrase has reference to an early belief that the bell of a church warded off bolts of lightning. The inscription suggested Schiller's celebrated *Song of the Bell* and Longfellow's *Golden Legend.* An old castle built in 1564 stands on a height commanding the town. It has the form of a round tower several stories high.

Scheele, Karl Wilhelm (1742-1786), a Swedish chemist. At an early age he was apprenticed to an apothecary and there laid the foundation for his remarkable record later as an investigator. His first noteworthy discovery was tartaric acid, which brought him to the attention of Bergman, one of the most noted chemists of his time. In 1770 Scheele became assistant professor of chemistry at the University of Upsala, where most of his work was done. Wholly independent of Priestly and Lavoisier, with whom he divides the honor, he freed oxygen and recognized it as a new gas. Chlorine was first discovered by Scheele, as was also glycerine, barta, and prussic acid. His experiments with arsenic led to his obtaining the color known as Scheele's green. No chemist has exceeded Scheele in the discovery of new substances.

Scheldt, skĕlt, a river of western Europe. It rises in northeastern France and flows through Belgium and the Netherlands into the North Sea. Its mouth is directly opposite that of the Thames. At Ghent it is navigable for boats of considerable size.

By the time it reaches Antwerp, it is 45 feet deep and 1,600 feet wide. It here forms a capacious harbor. In his *Traveler,* Goldsmith speaks of the river as the "lazy Scheldt," an epithet applied fittingly, for the river crawls slowly to the sea through a fertile region of gardens and meadows intersected by canals.

Schelling, shĕl'ing, **Friedrich** (1775-1854), a German philosopher. He was a native of Würtemberg. He studied at the universities of Tübingen, Leipsic, and Jena. At the latter he came under the influence of Fichte. He held university positions at Erlangen, Vürzburg, Munich, and Berlin. In the development of German philosophy he follows Fichte and precedes Hegel. The kernel of his thought is difficult to state. He taught that the mere mind or intellect of man recognizes two divisions of the universe. They are matter and mind,—the objective and the subjective, the real and the ideal, being and thought, body and soul, the finite and the infinite. "In fact, however," says Schelling, "the two are one. God and Nature are the same."

Schenectady, ske-nĕk'tà-dĭ, a city in New York on the Mohawk River and the Erie Canal. It is important as a railroad center; electric lines connect it with Troy, Albany, Saratoga Springs, Amsterdam, Gloversville and other cities and towns. Several important manufacturing firms have their establishments here, among them the main plant and general offices of the General Electric Company, the International General Electric Company, the Westinghouse Agricultural Works and the chief plant of the American Locomotive Company. Other establishments manufacture furniture, collars, patent medicines, electrical supplies, knit goods, stoves, sash and blinds, carriages, varnish, boats, shawls, underwear and laces.

The city is the seat of Union College, an institution devoted to cassical and technical education. The technical courses are conducted in connection with the research laboratory of the General Electric Company. The college has a beautiful campus of over one hundred acres.

Here is located the oldest railroad station existing in this country, the original terminus of the Albany and Schenectady Railroad. Other buildings, dating back to colonial times are the Bradt, Sanders and Yates houses.

Schenectady was the scene of a dreadful Indian massacre in 1690 in which the town was burned and all but sixty persons killed. A public library, state armory, county and Federal building, two hospitals, and thirty schools are among the important public buildings. The school system is conceded to be among the best of New York state. Six new intermediate or junior high schools were opened after 1920. Within the last four years over $4,000,000 has been invested in new school buildings. The population in 1920 was 88,723.

Schiaparelli, skē-ä-pä-rĕl'le, **Giovanni Virginio** (1835-1910), an Italian astronomer. He was born at Savigliano in Piedmont, and was educated in Turin, Berlin, and Pultowa, Russia. In 1859 he went to Italy and was made assistant at Milan observatory. In 1862 he became director, which position he retained until 1900. He discovered the planetoid Hesperia, also the markings (canals) on Mars, to which his name has been given.

Schiaparelli made numerous contributions to science on astronomical subjects.

Schiller, shĭl'er, **Johann Christoph Friedrich** (1759-1805), a German dramatist and poet. His grandfather and great grandfathers were bankers in a village on the Neckar. His father was an officer and later overseer of the grounds and gardens of the Duke of Würtemberg near Stuttgart. Here, at the command of the duke, the lad was sent to a military academy. Later he studied law and medicine and received an appointment as a medical officer in a Stuttgart regiment. Schiller was never a satisfactory student. He preferred to read. He had come under the influence of Klopstock's *Messiah,* Shakespeare's plays, McPherson's *Ossian,* and, worst of all in the eyes of his orthodox friends, the writings of Rousseau. The result was the publication of a play, *The Robbers.* It was presented to an applauding audience at Mannheim, whither Schiller had stolen away without leave to see it acted. A second offense, for he held a military appointment, brought him two weeks' confinement in prison and a peremptory order from the duke to write no

more and to close correspondence with outside friends. September 17, 1782, he fled from Stuttgart. His life for many years was that of a penniless wanderer. He managed usually to live with some acquaintance for a time in some quiet village in the vicinity of Mannheim, Leipsic, or Dresden while he wrote a play. He then put it on the stage. At Weimar he was made welcome by Herder, the grand old pastor of Weimar, one of the fathers of German thought.

Schiller's plays are chiefly historical. In the scholarly atmosphere of Weimar he betook himself to writing his histories, *The Revolt of the Netherlands* and *The Thirty Years' War*. These volumes possessed a freshness, an air of authenticity and a freedom of style that were pleasing to readers. They procured Schiller a call (1789) to a chair in the neighboring university of Jena. He was now able to marry and to have a home of his own. He also revisited his parents. At Jena an intimacy grew up between Goethe and Schiller. Goethe declared that Schiller made him a boy again. Under Goethe's quickening influence, Schiller acquired new ideas and new ambitions, and entered upon the most vigorous period of his intellectual activity. The two friends together wrote epigrams for an annual volume of poems and vied with each other in writing ballads. To this happy period of Schiller's life belong *The Song of the Bell* and the three *Wallenstein* plays, also *Maria Stuart, The Maid of Orleans,* and *William Tell*. During his later years, he retired from the university and resided at Weimar, the recipient of a literary pension.

He was a tall, slender, pale man with the formal carriage of a soldier, acquired in youth. Schiller was a fearless, thoughtful man gifted with the power of expression, and German to the core. He was serious, with little sense of humor,—a man of high aims, an uncompromising German patriot. His writing was done when French influence and French literary models, like French fashions, were all powerful, at a time when Germans needed a literature to rally around, —a literature to make Germans proud of the Fatherland. Of him it may be said truly that he turned a page in the history of German thought, for he was more thoroughly German and more courageous than Goethe. He is to this day the most read of the great writers of Germany.

Schiller died at Weimar in his forty-sixth year. His remains were placed in an oak casket covered with laurel and were deposited in the ducal vault. A beautiful bronze memorial in the marketplace of Weimar represents Goethe tendering the laurel wreath of poesy to his younger brother in literature.

See WEIMAR; GOETHE; LESSING; WALLENSTEIN.

Schlegel, shlā'gĕl, **August Wilhelm** (1767-1845), a German poet and critic. He was born at Hanover and received his education at the University of Göttingen. His first literary work of importance consisted of translations from Dante and Shakespeare, his work in this line causing Shakespeare to be known almost as well in Germany as in England. He translated also the works of Italian, Spanish, and Portuguese poets. In this he was wonderfully successful. Hosmer says that "Shakespeare, Calderon, Petrarch, and Dante speak through Schlegel as they would have spoken had they talked German." In his original poems Schlegel showed some grace and beauty, but he possessed no creative genius and produced nothing great. His *Lectures upon Dramatic Art and Literature* are a valuable contribution to critical literature.

Schlegel, Karl Wilhelm Friedrich (1772-1829), a German poet and critic. He was the younger brother of August Wilhelm Schlegel. Friedrich Schlegel, as he is usually called, is considered by many as the more able of the two brothers, but he is less known to English readers. He was born at Hanover. He studied at Göttingen and Leipsic, and became noted as one of the foremost scholars of his time. He was the first to bring Sanskrit literature to the notice of German scholars. He was influenced profoundly by the philosophy of Fichte, the idealist, and by that of Schelling. Oppressed by the conditions of his own times, he turned to the past and found ecclesiastic life in the Middle Ages attractive. He joined the Roman Catholic church, hoping and believing that it might come again to the position of power it had held in former times. Schlegel lectured on

philosophy, history, and literature, and was celebrated widely for brilliancy as a talker. His poetry was famous also and much of it is beautiful, though it is dreamy, mystical, and full of obscurity. As a critic, Schlegel's work was, like his brother's, that of the interpreter. He was more given to enthusiastic praise and to prejudiced criticism than the elder Schlegel. His most important prose works are *On the Language and Wisdom of the Indians* and *Lectures on the History of Ancient and Modern Literature.*

Schleswig-Holstein. See DENMARK; PRUSSIA.

Schley. See SPANISH-AMERICAN WAR.

Schliemann, shlee'män, **Heinrich** (1822-1890), a German merchant, antiquarian, and traveler. He was a native of Mecklenburg-Schwerin, and died in Naples. He traveled extensively in the employment of Amsterdam commercial houses with which he was connected. Having amassed a fortune by successful trade, he retired from business in 1864 and devoted himself to the study of Greek archaeology. In 1870 he began excavating on the site of ancient Troy, a work which he prosecuted incessantly for twenty years. The rich collections of antiquities he deposited in a museum at Berlin. He also explored the ruins at Mycenae and elsewhere. He wrote a number of works. The most celebrated is *Trojan Antiquities.* See TROY.

Schofield, John McAllister (1831-1906), an American soldier. He was born at Gerry, New York, the son of a minister. In 1853 he was graduated from West Point, then for two years did garrison duty in South Carolina and Florida. Until 1860 he taught physics at West Point, and then for a year at Washington University, St. Louis. At the outbreak of the Civil War he entered the Union Army, and was promoted to the rank of brigadier-general and brevet major-general. During the war he served on the staff of General Lyon in Missouri, 1861; was commander of the District of Missouri in 1862; had command of a division of the Army of the Cumberland, 1863, and in 1863-4 again had command of the Department of Missouri. The last year of the war he was assigned command of the Army of the Ohio; took part in Sherman's Georgia campaign; won the battle of Franklin, and was transferred to the Department of North Carolina. In February he captured Wilmington, in March fought the battle of Kinston, and joined Sherman at Goldsboro. After the war he served in the regular army, being at one time secretary of war, and again the superintendent of West Point. From 1888 to 1895, when he retired with the rank of lieutenant-general, he was chief in command of the United States Army.

Scholasticism, a name applied to medieval methods of philosophical and theological study. Such studies were confined to schools and universities; hence those who pursued them were called schoolmen, and their methods scholasticism. In brief, these methods consisted in formal reasoning, and were the direct opposite of the more modern and scientific methods of investigating a subject by experiment and observation. The schoolmen regarded Aristotle as authority on all matters pertaining to philosophy, nor did they permit themselves to question the doctrines and teachings of the church. Attempting to apply the logic of Aristotle to theological problems, they asked not, "Are these doctrines true?" but "Why are they true?" To harmonize revelation and reason was thus their aim. Scholasticism came into prominence during the eleventh century, St. Anselm being mentioned usually as the earliest of the schoolmen, although the name is given sometimes to John Scotus Erigena, an Irish philosopher of the ninth century.

The greatest controversy among schoolmen was between the realists and nominalists. The nominalists held that general conceptions exist in name only; the realists, that such conceptions are actualities. These views led to endless discussions. In theology, the doctrine of the immaculate conception was one of the chief points of discussion. With Duns Scotus and Thomas Aquinas of the thirteenth century, scholasticism culminated. These two leaders represented the two great orders—Franciscan and Dominican—and their quarrels, taken up by unworthy successors and degenerating into wearisome hair-splitting quibbling, tended to weaken scholasticism. Roger Bacon was influential in its decline. He

found fault with the dependence upon Aristotle, who, he declared, had only planted the tree of knowledge, which "had not yet put forth all its branches nor produced all its fruit." Mystical theology, appealing to the heart and spirit of man rather than to the reason, began to attract attention, and with Luther and the Reformation, scholastic philosophy ceased to be powerful. The writings of Lord Bacon and Descartes mark the transition to the more modern modes of thought, although in the universities scholasticism died slowly, and in some countries was to be found as late as the eighteenth century.

Taine says in regard to scholasticism that, "Three centuries of labor at the bottom of this black moat added not one idea to the human mind." This is true doubtless. Extended discussions over such questions as whether God can make a yardstick without two ends, whether more than one angel can occupy the same space at the same time, how many devils can dance on the point of a needle, and whether God knows more things than He is aware of, would hardly be expected to add anything to the sum of human knowledge. It must not be inferred, however, that scholasticism was devoid of service to intellectual progress. These philosophers were men of learning and insight, and their training in logic sharpened their minds and helped them to make accurate distinctions; while the constant appeal to reason "was preparing the way for the full and plain assertion of the principle of the freedom of thought."

See ABELARD; SCOTUS, DUNS; BACON, ROGER; ALCUIN.

School, a place where instruction is given. The word comes to us through the Latin, later, from the Greek, and meant originally a pausing, or resting; a way in which "resting" or leisure was employed; finally, disputation, because the ancient Greeks often spent their leisure in philosophical discussion. The word has acquired a great many somewhat varied meanings, but in the sense in which it is used more often it means a place where children are taught.

Since the beginning of civilization, schools of some sort have existed, although at certain times and in some countries only the children of the rich, or those who were to be fitted for the priesthood received education. The idea of free public schools entirely under state control is largely a development of the nineteenth century. The public school systems of America are the only systems so far developed which meet the needs of democratic communities logically and adequately. Those systems offer education to all, and are patronized by all classes. They include all stages of education and are so arranged that pupils may pass from a lower to a higher grade without difficulty.

The public school system of the United States embraces first, those schools which are devoted to primary education, including all grades below the high school; second, those devoted to secondary education, that is, high schools and such institutions as prepare students for college; and third, those devoted to higher education including colleges and universities. The United States Commissioner of Education reported 17,506,175 pupils enrolled in the common schools, that is, the primary schools of the country during the year 1908-9. The enrollment in secondary schools, including private high schools and students in the secondary departments of normal schools, was 1,034,827. The three general classes of schools mentioned above are supplemented by normal schools, evening schools, manual training schools, industrial schools, including agricultural and technical schools, vacation schools, summer schools, county training schools, correspondence schools, and schools for the blind, for the deaf, and for the feeble-minded. There are many private schools of all grades, academies and colleges, and many endowed institutions of learning.

Many of the special schools in this list are treated in special articles. Evening schools are held during the evening for the purpose of giving instruction to those who cannot attend day schools. The first successful evening schools in the United States were opened about the middle of the nineteenth century, the idea developing until such schools became in many cities a recognized part of the educational system. The curriculums of evening schools include the common branches, and often subjects

which have a bearing upon commercial and industrial occupations.

In 1910 there were in the United States 227 cities of over 8,000 inhabitants whose educational systems included evening schools. At these 374,364 students were enrolled. Besides the public schools many institutions like Cooper Union, New York, and Drexel Institute, Philadelphia, offer evening courses. The Young Men's Christain Association provides evening schools in many cities, instruction being given by this means to over 25,000 students. There are also thirty-five law schools and over 400 commercial schools which give evening instruction.

Summer schools are in some cases an expansion of the Teachers' Institute of former years, and offer instruction for a month or six weeks to teachers of rural or graded schools. Many universities offer summer courses and there are a number of independent summer schools, of which that held at Chautauqua, New York, is best known. These schools are designed especially for those beyond school age and offer also correspondence courses, usually through local clubs. The requirements for admission to the summer schools are light, or else done away with altogether.

County training schools are of the nature of normal schools, with the purpose of offering a course of which rural school teachers can take advantage by reason of the small expenditure of time and money required. The state of Wisconsin was the first to establish such schools, in 1899, by offering state aid to the extent of half the cost of maintenance, although not to exceed $2,500 to counties establishing such schools, the plan being that some village should turn over its school to the county for practice work in the normal course.

Vacation schools have become common in large cities since 1898. Their object is to provide pleasant and profitable occupation for children during the extreme heat of summer. The courses are practical, including sewing, cooking, gardening, manual training, and nature study. The actual work of the school-room is varied by frequent excursions.

Correspondence schools or courses are, in some instances, a part of university extension work, but the greater number of correspondence schools are organizations of stock companies and are on a commercial basis. The larger and better ones offer good courses in many subjects, but are expensive, a course costing usually from $30 to $100.

In many cities special schools are established for defective and abnormal children, and open-air schools are held for the consumptive and the delicate. Various institutes and associations help to educate teachers for their profession. Free libraries, traveling libraries, and study clubs offer educational advantages in almost every locality. In fact, as G. Stanley Hall has said, it seems that "nothing in the history of the world has ever been supported by a consensus of belief more universal than that which sustains education. The World goes to school."

Schoolcraft, Henry Rowe (1793-1864), an American ethnologist, writer, and traveler. He was born at Watervliet, now Guilderland, New York, and died at Washington, D. C. He was educated at Middlebury and Union Colleges. Chemistry and geology were his favorite subjects. After graduation he had experience in a glass factory of which his father was manager. He wrote a work on the manufacture of glass. In 1818 he was appointed to the geological survey of Missouri and Arkansas. He wrote a *View of the Lead Mines of Missouri.* Soon afterward he was appointed as geologist to accompany General Cass on an exploring expedition to the Superior copper region. In 1823 he was made agent for Indian affairs. He then married a chieftain's granddaughter and settled down at Sault Sainte Marie and Mackinaw. In 1828-1832 he represented the region in the legislature of Michigan. In the latter year he took advantage of an errand on Indian business to explore the upper waters of the Mississippi, and on this trip he discovered and named Lake Itasca. While Indian agent, he secured the cession of 16,000,000 acres of land to the United States. His birth near the Iroquois, his marriage, and his long residence among the Indians of the Superior region gave Schoolcraft an acquaintance with Indian manners and customs. A college training enabled

him to make use of the information. Among his writings are *Memoirs of a Residence of Thirty Years with the Indian Tribes, The Myth of Hiawatha and Other Oral Legends, Notes on the Iroquois,* etc. His great work, however, was *Historical and Statistical Information Respecting the Indian Tribes of the United States.* It is a six volume treatise with 336 plates made from original drawings issued under direction of Congress at a cost of $30,000 per volume. The historian Parkman was of the opinion that Schoolcraft had not made the most of a great opportunity. It is not too much to say, however, that the work is a vast storehouse of information relating to Indian antiquities. Longfellow was indebted to Schoolcraft for the name and the material of Hiawatha. See ITASCA; LONGFELLOW, etc.

Schoolmen. See SCHOLASTICISM.

Schools, Correspondence. See SCHOOL.

Schopenhauer, shō′pen-hou-er, **Arthur** (1788-1860), a celebrated German philosopher. He was born at Dantzic and died at Frankfort-on-the-Main. When Dantzic lost its independence in 1793 the family moved to Hamburg. Here the son, at the age of seventeen, was placed in the office of a merchant; the father, who had acquired a fortune in mercantile pursuits, intending that his son should follow in his footsteps. The elder Schopenhauer died soon after, and the young man, disliking business, determined to devote himself to study. In 1813 he obtained the degree of doctor of philosophy from the University of Jena. He developed a system of his own, looking first with contempt and later with jealousy and bitterness upon Hegel and the idealistic philosophy, then at the height of its popularity. Toward the close of his life, Schopenhauer's views began to attract attention, and he enjoyed in his old age the admiration he had long craved. His most important work was *The World Considered as Will and Idea.* His fundamental doctrine is that the only essential reality in the world is will. He admired Plato and Kant, claiming to be the true successor of the latter, although in many points the two philosophers differ. Schopenhauer is regarded as the chief expounder of pessimism. He claims that life is essentially painful and all pleasure merely negative; that is, it is simply the relief arising from cessation of pain. See KANT; HEGEL.

Schubert, shōō′bert, **Franz** (1797-1828), a German poet and musician. A native of Vienna. Schubert's most noted songs are *Erl King, Ave Maria, Serenade, The Young Nun,* and *Margaret of the Spinning Wheel.* His piano compositions are described as light in style and exquisite in feeling. He left some six hundred songs and over four hundred musical compositions.

Schumann, shōō′män, **Robert,** (1810-1856), a German musical composer. A native of Saxony. Educated for the law. He neglected his legal studies at the universities of Leipzig and Heidelberg for literature and society. One or two dramas met with little success. At Leipsic he came under the influence of Mendelssohn and was a careful student of Bach. Schumann injured his right hand, but married a brilliant pianist, Clara Wieck, who brought her husband's compositions to public notice in the chief musical centers of Europe.

Schumann-Heink, Ernestine, nee Roessler, (1861-), a distinguished dramatic contralto, one of the greatest of her time, was born at Lieben, near Prague, Bohemia. She made her first appearance in grand opera in Dresden in 1878, when she was but seventeen years old, her rôle being Azucena, in *Il Trovatore.* She sang for four years at Dresden, and from 1883 in the Hamburg-Stadt theater. Her American premiere occurred in 1898 at the Metropolitan Opera House, New York, where she achieved great successes, especially in Wagnerian rôles. Mme. Schumann-Heink has endeared herself to concert and opera goers, not alone for her splendid gifts of song, but also because of her simplicity and kindness. In recent years Mme. Schumann-Heink has sung almost entirely in concerts.

Schurman, Jacob Gould (1854-), an American educator. His father was of Dutch descent and his mother was an Englishwoman. He was born in Freetown, Prince Edward Island. He studied in Arcadia College and later in the Universities of London, Edinburgh, Heidelberg, Berlin and Göttingen. He taught philos-

ophy and English in Acadia College and in Dalhousie College. He was appointed professor of philosophy in Cornell University in 1886, and after four years he was promoted to the deanship of the Sage School of Philosophy. In 1892 he was elected president of Cornell University and filled the position with great credit, resigning in 1920. He spent one year as president of the United States Philippine Commission. In 1921 he was appointed minister to China by President Harding. He is the author of the books, *Kantian Ethics and the Ethics of Evolution, Ethical Import of Darwinism, Belief in God, Agnosticism and Religion, A Generation of Cornell, Philippine Affairs, A Retrospect and Outlook,* and joint author of the *Report of the Philippine Commission of 1900.*

Schurz, shŏŏrts, **Carl** (1829-1906), a German-American statesman and author. He was born in Liblar, near Cologne, attended the gymnasium at Cologne, and then entered the University of Bonn. He became a revolutionist as early as 1848 and was forced to flee to England and France. He came to America in 1852 and after settling in Milwaukee as a practitioner of law, he became closely allied with the Republican party. He took up the anti-slavery cause and did much to turn the German element of the state against slavery. He took active part in the Civil War, as an officer in the Union Army, distinguishing himself in the Second Battle of Bull Run, at Gettysburg, and at Chattanooga. After the war he represented Missouri in the United States Senate and later entered the field of journalism. He was editor of the *New York Evening Post* and contributed freely to *Harper's Weekly.* He was an advocate of democratic principles, became a strong anti-imperialist at the close of the Spanish War, and an ardent supporter of civil service reform. As an author he is known by his excellent *Life of Lincoln,* those of Henry Clay, Charles Sumner, and his own autobiography.

Schuyler, Phillip. See SARATOGA.

Schwab, Charles M. (1862-), an American capitalist and steel manufacturer, was born at Williamsburg, Pa. He began his career in steel as a stake driver in the engineer corps of the Edgar Thompson Steel Works. He rose steadily from one position to another, until in 1892 he became superintendent of the Homestead Steel Works. Schwab was a leader in the formation of the United States Steel Corporation, and became the first president of that organization. In 1903 he became president of the Bethlehem Steel Works, which has had a remarkable growth under his management. During the World War this corporation supplied the Allies with enormous quantities of ammunition.

Schwatka, shwŏt'ka, **Frederick** (1849-1892), an American explorer, born at Galena, Illinois. He was graduated at West Point in 1871. In 1878 he obtained leave of absence to head the search for the remains of Sir John Franklin's ill-fated expedition. He was successful in finding Franklin's journals in a cairn of stones and returned with a creditable amount of information relative to the Arctic regions. He was the recipient of medals and honors from the geographical societies of Paris, Russia, Rome, Berlin, and Geneva. He engaged also in the exploration of the Yukon Valley and the ascent of Mount St. Elias; the former for the United States government, the latter for the New York *Times.* In 1884 he resigned his commission in the United States army, his rank being that of lieutenant. Among his writings are *Along Alaska's Great River, A Nimrod of the North,* and *Children of the Cold.* See FRANKLIN; NANSEN; GREELEY; ARCTIC REGIONS.

Sciatica. See RHEUMATISM.

Science, in the generally accepted meaning of the term, knowledge systematized and formulated with reference to the discovery of general truths or the operation of general laws. There are two general divisions of Science, one including the sciences which deal with matter, and the other including those that deal with mind. For detailed description see ASTRONOMY; BIOLOGY; BOTANY; CHEMISTRY; PHYSICS; PSYCHOLOGY, etc.

Science and Health with Key to the Scriptures, the text-book of the Christian Science denomination, published by MRS. Mary Baker Eddy in 1875. By 1906 this

book had gone through 290 editions of 1,000 copies each. Since that time no statistics have been issued but new editions continue to appear. The book has been revised many times by its author. That it is called the text-book of the denomination must not lead to the conclusion that it is in any sense a substitute for the Bible. Christian Scientists accept the Bible as the inspired Word, and as a "sufficient guide to eternal life." It is read in the churches and it is expected of individuals that they read and study it daily in connection with *Science and Health*. As the title indicates the "text-book" consists of two parts. The first part, *Science and Health,* contains fourteen chapters, embodying Mrs. Eddy's teachings, and rules for the application of the principles set forth in the treatment of disease and all evils. *The Key to the Scriptures* is an exegesis, or interpretation, of the books of *Genesis* and *Revelation*.

Quotations: "Divine Love always has met and always will meet every human need."

"Self forgetfulness, purity, and affection, are constant prayers."

Scipio, Publius Cornelius (234-183 B. C.), known in history as Scipio Africanus Major. He became commander of the Roman forces in Spain. He reduced that province to tolerable order, and returned to Rome toward the close of Hannibal's campaign in Italy. In 207 he stood for the consulship and was placed in chief command of the armies. He "carried the war into Africa," forced Hannibal to return home, and defeated him utterly in the decisive battle of Zama. Scipio was content with the crippling of Carthage. He did not share the opinion of Cato that "Carthage must be destroyed." Scipio and Hannibal were the great military geniuses of the age, and regarded each other with the highest respect. This Scipio was the father of the celebrated Cornelia, the mother of the Gracchi.

Scipio Africanus Minor, or the Younger (185-129 B. C.), an adopted grandson of the former. He brought the Punic Wars to a close by the capture and destruction of Carthage 146 B. C. On his return to Rome he supported the aristocratic faction and opposed the reforms proposed by his cousins, the Gracchi. He was found dead in his bed the morning of a day on which he had proposed to speak in the Senate on the land question, "a victim of political assassination," says Mommsen.

See HANNIBAL; GRACCHI.

Scone, skōōn, a small village of Scotland. It is situated on the Tay, two miles above Perth. It was once famous for the Abbey of Scone, destroyed by the Scotch Reformers. The early Scottish monarchs were crowned here. The famous Stone of Scone which figured in the coronation exercises was kept here. It was traditionally the stone once used by the patriarch Jacob as a pillow. In 1297 it was taken to London by Edward in token of the complete subjugation of Scotland. It now rests in Westminster Abbey, under the seat of the old coronation chair of the Scottish kings. It is said that the stone once bore this legend:

Should fate not fail, where'er this stone be found,
The Scot shall monarch of that realm be crowned.

Scôp. See MINSTREL.

Scorpion, an animal allied to the spider. The scorpion has a large pair of feelers strikingly like the claws of a lobster or crayfish. These claws are used to seize spiders and large insects which the scorpion pursues at night with great activity. The last seven segments of the abdomen are extended like a tail. The last segment terminates in a sting with which the scorpion paralyzes its prey. When aroused, the scorpion brandishes its sting in a threatening manner. Scorpions are natives of warm or torrid countries. Some twenty species are found in the South. The sting of certain tropical species is represented to be fatal to man. In Rev. ix: 5 extreme pain is likened to "the torment of a scorpion when he striketh a man." The various species are from two to six inches in length. The people of southern Europe are careful to shake their shoes before they put them on, least a scorpion may have taken shelter in them. Scorpions are not rare in the arid regions of the Southwest. Mounted specimens are sold as curios. One dealer in Pasadena, California, claims to sell 5,000 scorpions a year. He employs Indians and boys to collect for him.

Scotland, a division of the United Kingdom. It occupies the northern part of

the island of Great Britain. It is separated from England chiefly by the Firth of Solway, the Cheviot Hills, and the Tweed. The distance from sea to sea is about sixty miles in a straight line; but the "Border" with its windings is about one hundred miles in length. The mainland is surrounded, especially on the west and northwest, by numerous islands. There are 160 islands of some size and about 600 smaller islets. The shores are, for the greater part, rocky and abrupt. They are penetrated on the west and north by deep firths whose beds were furrowed out in glacial times by streams of ice.

Leaving out of consideration the Cheviot region, Scotland may be said to be divided into two physical regions, the Highlands and the Lowlands. The Highlands, occupying the northwestern two-thirds of the country, are mountainous. The best known peaks are Ben Nevis and Ben Lomond. The surface is intersected by glacial valleys and contains a very great number of fine, clear lakes. The larger are known as lochs; the smaller as tarns. Among the more noted are Lochs Lomond, Katrine, Ness, Leven, and St. Mary's. The more noted of the rivers flowing easterly are the Tweed, the Forth, the Tay, and the smaller Spey. The Clyde is the chief river of the west. Other western streams are the Ayr, the Doon, the Nith, and the Annan.

Scotland is rich in rocks and minerals. The Highlands may be said to be composed of schists, gneiss, and other old rocks. The granite quarries of Aberdeen are noted. Enormous bodies of coal and iron are found in the lowlands, and make that district one of the wealthiest regions in the world.

The most southerly point of Scotland lies five degrees farther north than the most northerly point of the United States. The northern extremity of Scotland lies farther north than Sitka, Alaska. The climate, however, is oceanic. The summers are cool; the winters are comparatively mild and cloudy. The coasts are swept by more severe storms than are known in the interior of the United States. Sleet, hail, and snow are common; but blizzards, as we have them, are unknown. The lochs freeze over in winter. At this season curling is the national pastime.

Forests cover about four per cent of the total area. They lie chiefly in the northern counties. One-fourth of the surface is devoted to grazing, fifty-nine per cent is in field and meadow, and twenty-one per cent is described as uncultivated, being chiefly rock or morass. Agriculture is confined chiefly to the Lowlands. Scottish plowmen are noted for even, straight furrows. Oats and hay are the chief field crops. The soil and climate are well adapted to turnips, potatoes, and other root crops. The summers are too cool for the production of corn or melons. Orchard fruits, strawberries, and other small fruits do well. American farmers are indebted to Scottish stock raisers for Clydesdale horses, Polled Angus and Galloway cattle, and for the Ayrshire strain of dairy cows.

The population in 1921 was rated at 4,882,288, somewhat in excess of 164 to the square mile. About one-tenth of the people of Scotland are engaged in farming. Another tenth follow commercial pursuits. About half are engaged in mining and manufacturing. Owing to the growth of manufacturing, the rural population is decreasing; the town and city population is growing. The leading manufactures are those of iron, woolens, and cotton goods. There were in 1921, about 5,000 miles of railway and 848 miles of canals.

Scotland is divided into thirty-three shires or counties. The criminal judge of a county is known as the sheriff. There are nine cities having a population of over 30,000 each. Named in order of population they are Glasgow, Edinburgh, Dundee, Aberdeen, Paisley, Leith, Greenock, Kilmarnock, and Perth. The chief magistrate of a town is known as a provost. Aldermen are called bailies. The counties are subdivided into parishes. Each parish maintains a clergyman of the Established Church of Scotland (Presbyterian) at public expense. A parallel system of independent churches, known as the United Free Church, is maintained by voluntary contributions. The Church of Scotland and the United Free Church have about half a million adherents each. Third in order comes the Roman Catholic church with 400,000 adherents.

Education is looked after with care. Il-

literacy is rare. Parish schools were maintained for two or three centuries. In 1872 a system of public schools was inaugurated. It does not differ materially from the American organization. There are four Scottish universities. They are situated at Edinburgh, Aberdeen, Glasgow, and Saint Andrews respectively.

Prior to the dawn of history it is thought that a people similar to the Basques inhabited the greater part of Scotland. When the Romans invaded Scotland, however, a Celtic people occupied the country north of the Firth of Clyde. They were called Caledonians by the Romans. The country was called Caledonia. The southern part of Caledonia was occupied by another Celtic tribe more closely related to the Welsh. These Celts or Caledonians were later called Picts. About the sixth century a horde of Scots, a third Celtic tribe from Ireland, invaded western Scotland and gave their name to the country. The Highlanders are descendants of the Picts and Scots; the Lowland Scotch, like the English, are the descendants of Teutonic tribes who crossed the North Sea into Britain during the fourth century and later. Norse colonies also were established in the Highlands of the north and west, as far south as the Isle of Man. The Donalds, Kenneths, Malcolms, Duncans, and Macbeths of early Scotch history were Celtic. The Teutonic or Lowland element asserted itself later. At present the various elements are hardly distinguishable.

The political history of Scotland is one of constant warfare with the Irish, the Norse, the Danes, and the English. The annals are filled also with a long series of conflicts between rival chieftains, a sufficient account of which has been given under separate titles. In 1603 James VI of Scotland inherited the throne of England. The two kingdoms were united into one with the consolidation of parliaments in 1707.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	29,796
Water area, square miles	609
Forest area, acres	874,910
Population (1921)	4,882,288
Chief Cities:	
Glasgow	1,034,069
Edinburgh	420,381
Dundee	1[illegible]3,217
Aberdeen	158,969
Paisley	84,837
Greenock	81,120
Motherwell	68,869
Clydebank	46,515
Coatbridge	43,909
Number of counties	33
Farm area, acres	3,380,000
Wheat, bushels	2,568,000
Barley, bushels	5,912,000
Oats, bushels	38,344,000
Potatoes, bushels	8,320,000
Turnips, bushels	7,132,000
Hay, tons	786,000
Fish catch, tons	260,000

Scotland Yard, the police headquarters of London. There are about 1,000 policemen in the old city of London. The entire force of policemen for greater London, detectives included, is not less than 16,000. Scotland Yard is situated near Charing Cross. It contains in one section the Black Museum, a motley collection of objects connected with crime and noted criminals. The premises are said to have been owned at an early date by the sovereigns of Scotland, hence the name. Scotland Yard is noted the world over.

Scott, Dred. See DRED SCOTT DECISION; TANEY.

Scott, Duncan Campbell (1862-), a Canadian author and public official, was born at Ottawa, Ontario, and was educated at Stanstead Wesley Academy. Mr. Scott entered the Canadian civil service in 1879, and by 1913 had risen to the position of deputy superintendent-general of the Department of Indian Affairs. For many years he contributed poems, historical and biographical articles, to Canadian and American magazines, and was joint editor of a series of historico-biographic papers—*The Makers of Canada.* Among his published works are *The Magic House and Other Poems, In the Village of Viger, John Graves Simcoe, Labour and the Angel, New World Lyrics and Ballads* and *Lundy's Lane.*

Scott, Frederick George (1861-), a Canadian clergyman and poet, was born at Montreal and educated at Bishop's College, Lennoxville and at King's College, London. In 1884 he was ordained deacon, and in 1886, priest. In 1887 he was made rector at Drummondville, Quebec, and became rector at St. Mathew's, at Quebec. During

the World War Scott was in Europe as senior chaplain of the first Canadian division of the British Expeditionary Force, and while at the front he wrote some of his best poems, published in book form under the title of *The Crown of Empire.* Other works are *The Hymn of Empire, My Lattice and Other Poems, The Unnamed Lake* and *The Key of Life,* poems; *Elton Hazelwood,* a novel; and *The Great War: What I Saw of It.*

Scott, Hugh Lenox (1853-), an American army officer, was born at Danville, Ky., and was educated at West Point. After graduation he joined the cavalry and served in many campaigns against the plains Indians. He commanded a troop of cavalry from 1892 until 1897. In 1898 Scott was made adjutant general of Cuba; he was governor of the Sulu Archipelago from 1903 to 1906; and from the latter year until 1910 was superintendent and commandant of West Point. He was made brigadier general in 1913 and as commander of the Second Cavalry Brigade was set to patrol the Mexican border. Scott was a strategist and a diplomat in the handling of questions affecting the Indians, and in 1915 was sent to Utah to pacify a band of rebellious Piutes. In 1914 he was promoted chief of the general staff, and was made brigadier general. Scott published a number of valuable monographs on the sign language of the plains Indians. He retired in 1917.

Scott, Robert Falcon (1868-1912), a British naval officer and Antarctic explorer. He was born at Outlands, England. His schooling was at Stubbington House, Fareham, and in 1881 he was entered as a naval cadet on the Brittania. His promotion was rapid and in 1900 he headed the National Antarctic expedition into the region of the South Pole. This consumed four years and as a result of this, he was appointed Captain. His last official position was naval assistant to the second sea lord of the Admiralty. He was the first to hold this position.

In 1909 he resigned, to prepare a second Antarctic expedition. On November 29, 1910, he sailed from New Zealand with a party of several scientists. After being landed and establishing a basis of supplies, nothing more was heard from him until a report came late in 1911 that he had discovered the Pole. This report proved to be without foundation and shortly after Amundsen returned and reported the discovery of the Pole.

Searching parties were sent out and on November 12, 1912, Scott and his party were found dead about eleven miles from a base of supplies. Scott's personal diary and those of his men were written up to the last. It proved that they had located the Pole within a half mile of where Amundson had located it, on January 18, 1912 and found the evidences that they were not first. They were stopped by a blizzard with only two days' supplies on hand and perished about March 29. Much valuable scientific data is given to the world as a result of this fatal expedition.

Scott, Walter (1867-), a Canadian statesman, was born in Middlesex County, Ontario. While still a youth he went to the Canadian Northwest. After settling in Regina he engaged in journalism, and was connected editorially with the Regina *Standard,* the Moosejaw *Times* and the Regina *Leader;* in 1899-1900 he was president of the Western Canada Press Association. In 1900 Mr. Scott was elected to the Dominion House of Commons as a Liberal, and was active in the negotiations leading to the passage of acts creating the provinces of Alberta and Saskatchewan. In 1905 he resigned his seat in the legislature to become premier of Saskatchewan; this post he held until 1917, having also been Minister of Public Works and Minister of Education. Mr. Scott was instrumental in closing the barrooms of Saskatchewan, and he was one of the most potent forces in the development of that province.

Scott, Sir Walter, a Scottish poet and novelist. He was born at Edinburgh, August 15, 1771, and died at Abbotsford, September 21, 1832. The Scotts were an old border family. Sir Walter traced his descent directly to Auld Watt of Harden, "whose name I have made ring in many a ditty," and to "his fair dame, the Flower of Yarrow,—no bad genealogy for a border minstrel."

When a child Walter took great pleasure in listening to the tales of border forays in which his ancestors took so great a part. Fortunately, from a nurse, an old soldier, and a blind poet, who found the little chap a receptive listener, he acquired a wealth of material which he afterwards used to so great an advantage in his poems and tales. At six he would sit for hours listening to tales. At ten he had a large collection of border tales and ballads. He took the greatest delight in Percy's *Reliques,* even to the forgetting of his dinner.

At the age of eight Scott was sent to the Edinburgh high school. Although lame from infancy, he was a leading spirit. He led the school boys in their fights with the boys of the town, and permitted no one to surpass him in climbing Salisbury Crag. Nothing pleased him better than to scale some precipice, gather friends around him, and entertain them with border tales and ballads until the sun went down. He was so full of high spirits, so generous, and, withal, so entertaining, that Walter was always in demand whenever fun or an excursion was planned.

Scott's father was an industrious lawyer. He desired his son to fit himself for the legal profession. Scott was a dutiful son and endeavored to comply; but, while a student at the university of Edinburgh, whither he was sent, he took more delight in haunting old bookshops in search of some stray chapman's book or ballad than in applying himself to musty volumes of law. He was very fond of taking long trips through Liddesdale and other valleys of southern Scotland. His steady father in despair declared he would never be anything but a "gangrel scrape-gut," that is a player on a violin, but as a friend who accompanied him on these excursions afterward said: "He was makin' himself a' the time, but he didna ken, maybe, what he was about till years had passed; at first he thought o' little, I daresay, but the queerness and the fun." Scott's affectionate relations to his father and his endeavor to do the latter's will are related with close adherence to facts in *Redgauntlet,* Alan Fairford being no less than Walter Scott himself.

Scott was in due time admitted to the practice of law, and, indeed, conducted a few cases; but he never became known as a lawyer. His legal studies were, however, of great service to him. Through his cheery manners and wide acquaintance he secured an appointment as sub-sheriff, a sort of justice of Selkirkshire, and was made also a clerk of the court in Edinburgh. The courts sat for about six months during the year. During this period Scott's duties required intense application for about four hours a day, leaving him free the rest of the day and year for literature. He held these positions for about twenty-five years. The joint salary was not far from $8,000 a year. He was able, therefore, to realize his oft quoted remark that "literature should be a staff, not a crutch."

It is convenient to treat of Scott's various lines of effort independently without following the order of time. His first literary efforts were translations from the German. He was an enthusiastic admirer of Goethe. In 1802 he completed a collection of the *Minstrelsy of the Scottish Border,* on which he may be said to have been engaged from his earliest childhood. This work appears to have suggested to him *The Lay of the Last Minstrel,* his first important poetical composition. It appeared in 1805, and brought him immediate fame. Scott himself was astonished at his own success, and rejoiced in it as genially as though he were complimenting another. *Marmion* appeared in 1808; *The Lady of the Lake* in 1810. *The Vision of Don Roderick, Rokeby, The Lord of the Isles, Harold the Dauntless,* and *The Bridal of Triermain* followed in order. Scott became convinced, however, that he had worked out his vein of poetry. He felt that after the publication of *The Lady of the Lake* his poems had fallen off in merit. The rise of Byron as a popular poet assisted Scott in coming to this conclusion.

In July of 1814, some time before he had ceased entirely to produce poetry, Scott's first novel, *Waverley,* appeared. He had had it in mind, however, and had done work on it at odd times from 1806. It was published anonymously, purporting to come from the pen of an untried writer. Scott strove laboriously to conceal the authorship. *Waverley* was received with the greatest enthusiasm. The "Great Unknown," as the

author was termed, was the literary problem of the day. Other novels by the "Author of *Waverley*" appeared at the rate of six volumes a year. *Guy Mannering, The Antiquary, The Black Dwarf,* and *Old Mortality* were published in rapid succession. The authorship became an open secret. It was avowed publicly at a literary banquet in Edinburgh. *Rob Roy, The Heart of Midlothian, The Bride of Lammermoor, The Legend of Montrose, Ivanhoe, The Monastery, The Abbot, Kenilworth, The Pirate, The Fortunes of Nigel, Peveril of the Peak, Quentin Durward, St. Ronan's Well, Redgauntlet, The Betrothed, The Talisman, Woodstock, The Two Drovers, The Highland Widow, The Surgeon's Daughter, The Fair Maid of Perth, Anne of Geierstein, Count Robert of Paris,* and *Castle Dangerous* complete the extraordinary list of novels from his pen. In all, seventy volumes were given to the press between the years 1814 and 1831. Lovers of Scott do not find a dull volume in the list. Young readers do well to begin with *Ivanhoe* and *Rob Roy, Quentin Durward* and *The Talisman.*

About the time that Scott's success as an author became pronounced, he formed the unfortunate plan of taking an interest in the printing house of James Ballantyne and Company, of Edinburgh. This firm was saved from bankruptcy only by the sale of valuable assets to the publishing house of Constable and Company. The two houses became associated in business matters. In spite of the enormous sales of Scott's works, the firms became involved in financial difficulties, owing chiefly, it is said, to the publication of expensive illustrated works for which there was insufficient demand to pay expenses. In 1826 the crash came. Sir Walter Scott found that, as a partner in the concern, he was morally responsible for debts amounting in the aggregate to $600,000. The blow would have crushed an ordinary man. Though weighed down by the burden, he set himself at work heroically to pay off the debt. He prepared a new edition of his works, so far as they had yet appeared. The entire British book-buying public, sympathizing with their favorite author in his distress, bought and bought liberally. In an incredibly short time he was able to pay off a large portion of the amount due. At a public meeting held by his creditors, he was complimented for his high sense of honor. His personal belongings, including his antiquities and treasures of art at Abbotsford, were released from the obligation which hung over everything that he possessed. Scott struggled on, however, to the end of his life. His last novels, showing unmistakably that his power was failing, were written with a view to diminishing the mountain of debt. The income from his works during the last years of his life was over $50,000 a year. Every available penny went to pay debts. He also completed the premiums on an insurance policy which netted his creditors over $100,000.

Even though Scott had not written a poem or a novel, he would have been one of the noted literary men of Scotland. He was a contributor to the *Edinburgh Review.* He fell out with the editorial management of that periodical and took part in the foundation of the *Quarterly Review.* He was a diligent collector and editor, as stated, of Scottish minstrelsy, and a voluminous writer on Scottish antiquities. He wrote a *History of Napoleon Bonaparte* in nine volumes. Though too lengthy to be popular, it is interesting from cover to cover. He also wrote a *History of Scotland* in two volumes. In the total number of works contributed to various departments of literature, Scott is said to have been excelled in volume only by Anthony Trollope.

In 1812, when Scott was in the tide of financial prosperity, he purchased an old farm on the Tweed near a former crossing, much used by the ancient abbots of Melrose. He named the estate Abbotsford. He purchased adjacent lands, set out plantations of trees with skill, and began the erection of a baronial home, adding wing after wing and turret after turret as rapidly as he acquired the means. Here he did the greater part of his literary work. He provided himself with a fine library and amassed a great quantity of armor and medieval antiquities. He was a hospitable man and liked nothing better than to entertain friends with walks through his plantations and with excursions on horseback to various parts of the surrounding country. He was immense-

ly popular with everybody in the vicinity, whether noble or peasant. People in every walk of life were eager to get a word with him. Tales of Sir Walter, his horse, and his dog are still current among the peasantry of that part of Scotland.

In 1797 Scott married a beautiful lady, the daughter of a French Protestant refugee. They had four children, two sons and two daughters. Sophia married J. G. Lockhart, a writer of no mean ability. His *Life of Sir Walter Scott,* in seven volumes, is one of the world's great biographies, ranking with Boswell's *Life of Johnson.* A short autobiographical sketch by Sir Walter, covering his childhood, forms the introduction to the first volume.

Sir Walter traveled extensively in Scotland. The scenes described in his poems and tales were visited by himself in person, and the details noted at first hand. He visited London repeatedly, and traveled on the continent. Toward the close of his life, when his powers were evidently failing, he was persuaded to go to the Mediterranean, if possible, to recover his health. Finding that he obtained no relief, he turned his face homeward and hastened his journey with a rapidity that impaired his strength. He reached Abbotsford in July, 1832, where he died one beautiful autumn afternoon. His last hours were soothed by the sound of the rippling waters of the Tweed, a stream whose silver shallows and furze-covered banks he never ceased in life to admire. His remains were buried in Dryburgh Abbey. Critics agree that Sir Walter Scott's life and character leave little to be desired. He was a gentleman in the best sense of the word. He kept clear of literary squabbles and jealousies. Seemingly everybody respected him—loved him. It was a sad day for the countryside—a sad day for the city—a sad day for Scotland—when Sir Walter Scott died. His principal poems and tales have been translated into many languages. His position in literature can never be disputed.

A complete list of Scott's writings comprises, beside novels and long poems, an astonishing number of articles and poems on miscellaneous subjects written for current periodicals. It contains also works of criticism and biography, editions of Dryden and Swift, the *Life of Napoleon* in nine volumes, *Tales of a Grandfather,* and *Demonology and Witchcraft.* The following list includes the more important poems:

POEMS.

Minstrelsy of the Scottish Border	1802-3
The Lay of the Last Minstrel	1805
Marmion	1808
The Lady of the Lake	1810
Vision of Don Roderick	1811
Rokeby	1812
The Bridal of Triermain	1813
The Lord of the Isle	1815
Harold the Dauntless	1817

The following is a complete list of Scott's novels. The dates given are those of the period in which the scenes are laid:

NOVELS.

	Dates.
SCOTTISH—	
Waverley	1745
Old Mortality	1679
Legend of Montrose	1645
The Abbot	1568
The Monastery	1559
Fair Maid of Perth	1402
Castle Dangerous	1306
ENGLISH—	
Ivanhoe	1194
Kenilworth	1575
Fortunes of Nigel	1620
Peveril of the Peak	1660
Betrothed	1187
Talisman	1193
Woodstock	1652
CONTINENTAL—	
Quentin Durward	1470
Anne of Geierstein	1477
Count Robert of Paris	1090
SOCIAL—	
Guy Mannering	1750
Antiquary	1798
Black Dwarf	1708
Rob Roy	1715
Heart of Midlothian	1751
Bridge of Lammermoor	1700
The Pirate	1700
St. Ronan's Well	1800
Redgauntlet	1770
Surgeon's Daughter	1750
Two Drovers	1765
Highland Widow	1755

See ABBOTSFORD.

In a little while, the "lord of the castle" himself made his appearance. I knew him at once by the descriptions I had read and heard, and the likenesses that had been published of him. He was tall and of a large, powerful frame. His dress was simple and almost rustic; an old green shooting coat with a big whistle at the buttonhole, brown linen pantaloons, stout shoes that tied at the ankles, and a white hat that had evidently seen service. He came limping up the

gravel walk, aiding himself by a stout walking staff, but moving rapidly and with vigor. By his side jogged along a large, iron-gray staghound of most grave demeanor, who took no part in the clamor of the common rabble but seemed to consider himself bound for the dignity of the house to give me a courteous reception.—Irving, *A Visit to Abbotsford.*

Scott, Winfield (1786-1866), an American soldier. He was a native of Petersburg, Virginia. He studied at William and Mary College and read law in an office at home. After a short period of practice he entered the army. During the War of 1812 he took part in the skirmishes of Chippewa and Lundy's Lane. He rose rapidly to the rank of brigadier. At the close of the war, he was awarded a gold medal by Congress and was brevetted major-general. President Jackson stationed him at Charleston during the nullification troubles. He had the general management of the Black Hawk War. He superintended the removal of the Cherokees from Georgia to Indian Territory. During the Mexican War he led the force that landed at Vera Cruz. He won the series of engagements that resulted in the capture of the City of Mexico. In 1852 he was the Whig candidate for the presidency, but was overwhelmingly defeated by Pierce. The outbreak of the Civil War found Scott in command. Before his inauguration Lincoln sent him word "to be prepared to hold or retake the forts, as the case may require, at and after the inauguration." After the first battle of Bull Run had demonstrated Scott's inability to cope with the situation he retired. He was a man of integrity, a soldier of no little military skill. A certain pompous military way about him gained him a name in the ranks as "Old Fuss and Feathers." He died at West Point.

Scott Monument, a remarkable Gothic memorial erected in honor of Sir Walter Scott. It is adorned with statues of Scott's chief literary characters. See EDINBURGH.

Scotus, Duns (1265?-1308), a Franciscan friar, prominent as a scholastic, philosopher, and theologian. His real name was John Duns, Scotus being a cognomen signifying his Gaelic origin. The surname Duns is without doubt from the name of a place, perhaps Dunse, Scotland, although Luke Wadding has attempted to prove the philosopher a native of Ireland, while John Leland has brought forward arguments to prove the name to be derived from Dunstane, a village in Northumberland, England. Scotus entered the order of Franciscan friars while young. He studied at Oxford and become a fellow of Merton College. His theological lectures were attended by crowds of students. In 1304 he removed to Paris, where he continued teaching theology with great success. He was an earnest champion of the doctrine of the immaculate conception, defending it against the objections of Thomas Aquinas, a Dominican friar. In philosophy, he was a realist, and held tenaciously to the doctrine of the absolute freedom of the human will. The followers of the two men, Scotus and Aquinas, were called Scotists and Thomists, and controversies between them were long carried on, deriving bitterness doubtless from the jealousy between the Franciscans and Dominicans. Scotus died at Cologne, Germany, when on a mission for his order.

Scotus' power lay in acute negative criticism of the views of others,—in the destroying of arguments by his hair-splitting fashion of reasoning,—rather than in any forcible establishment of his own position. So keen and ingenious was he in refuting the arguments of his opponents that he won the nickname of Doctor Subtilis, or "The Subtle Doctor." His followers came to be called Dunsmen by the Thomists. On the revival of learning, the scholastic methods of reasoning fell into disrepute. Then the Dunsmen "raged in every pulpit" against the study of the classics. Gradually the word *Dunsman* came to signify one opposed to learning, then one slow of learning or dull, and has finally degenerated into the one word "dunce," meaning a blockhead.

See SCHOLASTICISM; AQUINAS.

Scow, a large flat-bottomed boat, with broad, square ends used in dredging, etc.

Scranton, a city in Pennsylvania, noted for the mining of anthracite coal. It is situated in the Lackawanna valley, at the confluence of that river and Roaring Creek, and in the center of the greatest anthracite region in the United States. It is a well laid out city, with pleasant streets and parks. There are eight hospitals and sanitariums,

three theatres, a Y. M. C. A. building, also an R. R. Y. M. C. A. and a Y. W. C. A. building, an armory, a school for deaf mutes, and a public library. Scranton has the largest correspondence school in the world, known as the International Correspondence School. Among the many manufacturing establishments of the city are steel works, foundries, locomotive works, breweries, manufactories of silk, woolen, and cotton textiles, sash and blind factories, and manufactories of lace curtains, underwear, buttons, tobacco, and cigars. In 1920 Scranton had a population of 137,783.

Screw, in mechanics, a wooden or metal cylinder surrounded by a spiral ridge or thread, the turns of which are everywhere equidistant. The cylinder described turns in a hollow cylinder of equal diameter provided with a thread matching the thread of the first. In the case of a bolt, the outside cylinder is called a nut or bur. The jackscrew used in raising great weights is a familiar form of this machine. To compute the force exerted, friction aside, we multiply the power by a quotient obtained by dividing the circumference through which the power moves by the vertical distance between two successive turns of the thread. A force of say twenty-five pounds applied at the end of a wrench a foot in length is capable of balancing a weight of over 864 pounds if exerted on a nut having twelve threads to the inch. (25 lbs. $\times$ 12 $\times$ 2 $\times$ 3.1416 $\times$ 12.)

The common pointed screw used in woodwork in place of nails is a modification of the mechanical screw. The force is applied at the circumference of the handle of the screwdriver. The wood which the screw penetrates takes the place of the nut, and the screw cuts the outside thread as it penetrates. By reason of the thread, the wood screw holds better than a nail. The screw propeller or spiral series of flanges by which steamships are driven is also a modification of the screw.

According to the census for 1920 there were 143 establishments in the United States engaged in the manufacture of screws of various sorts, with an annual output valued at $40,015,460. Since 1854 screws have been made entirely by machinery at a great reduction of cost. Bits of wire fed into a hopper come out perfect screws. Even the microscopical screw used in watches is cut by an ingenious machine.

The screw has many uses, principal among which is that made of it by carpenters in drilling holes. Many vises are both opened and closed with the use of the screw. A type of screw called "jackscrew" is used for the moving or raising and lowering of buildings. There is also a screw which is instrumental in measuring distances by means of a very fine thread on the body of the machine.

Screw Pine, an East Indian plant belonging, with fifty other species, to a genus called *Pandanus*. It is not a pine. The common name has reference to a spiral arrangement of the leaves on the stem, somewhat after the manner of a pineapple. The common screw pine of India bears fragrant flowers from which the maker of perfumes derives a richly scented extract known as keora oil. The fruit is orange-shaped and is edible but without flavor. The leaves are made into matting and sacking. The Indian screw pine is planted along canals to prevent the banks from washing away. The plant is a native of the South Sea Islands and Asia. The leaves of the screw pine are spirally arranged in three rows, and are usually about four feet long. It grows very easily and abundantly, and is one of the earliest plants to be seen on the newly formed islands in the Pacific Ocean. In the greenhouses of the more temperate climates, these plants are cultivated purely for their ornamental effect. The leaves are also useful in the manufacture of bags.

Screw Propeller. See ERICSSON, JOHN; STEAMSHIP.

Scribe, in the modern sense, one skilled in penmanship. Other meanings are a writer or recorder of events, a reporter, a secretary, a copyist, and even a notary. In the Middle Ages the scribe carried an inkhorn, a bunch of quills, a penknife, sealing-wax, and paper or parchment, and other necessities of his profession. When the family desired a letter written or a document drawn up the scribe or notary came with his kit like a shoemaker, and, having completed his work, he repacked his portfolio and took his departure. Men of position and

large affairs employed a secretary continuously. The family names of Clerke, Clark, Scriver, and Scriber are derived, no doubt, like Carpenter and Smith, from the occupation of some ancestor skillful with the pen.

Scribes, in sacred history, a body of learned men who constituted the jurists and theologians of the Jewish church. It was their duty to compile the law and to teach it. They settled disputes in a judicial sense. In Matthew ii:4 it is related that Herod summoned the chief priests and the scribes of the people and asked them where Christ should be born. The more humble scribes acted as notaries, drawing up contracts and the like.

Scrim, a semi-transparent cotton fabric. It is loosely woven, sometimes plain, sometimes with lace effects. Scrim is finished in white or cream color. It is also dyed and printed with floral or conventional designs. It is used for curtains and draperies, as a foundation for Hardanger embroidery, and for fancy work of several kinds. A variety of linen scrim is used for lining the sleeves of men's coats.

Scrofula, a constitutional disorder thought, but not certainly known, to be the result of bacterial invasion. Though associated with tuberculosis and often bringing it on, scrofula is not due to the bacillus of that disease. Scrofula may be inherited or it may be acquired. It is most likely to develop in young persons, particularly in the case of children insufficiently nourished or living in dark or damp, unsanitary quarters. Scrofula manifests itself in the inflammation of various joints and of parts of the mucous membrane, but more often in glandular swellings of the neck. These swellings are as irritating as a boil; in fact, the name scrofula means a little sow, the rooter, the digger, the scratcher. The swellings very often soften and break through the skin into running sores, making one very uncomfortable and followed, it may be, by unsightly scars. Sunshine, pure air, bathing in seawater, and wholesome food are corrective. Cod-liver oil is a remedy. Mineral waters containing iodine, iron, and phosphate of lime are considered beneficial. A person having a fair, thin, creamy skin is said to have a scrofulous complexion. Scrofula was known formerly as king's evil. The people of France and England brought their afflicted children to the king in the belief that a touch of the royal hand might cure the little sufferers. On Easter Sunday, 1686, Louis XIV is reported to have touched 1,600 persons, saying in French, "The king toucheth thee, may God cure thee." Even the parents of as noted a man as Dr. Samuel Johnson, the literary dictator of London, sought aid from the healing hand of Queen Anne in 1712. The queen not only touched the lad of thirty months, but, as was the custom, presented him a touch-piece.

Scruple, anciently any very small measure. The scruple was used by the Greeks to designate the 24th part of an uncia of land, the 24th part of an hour, and the 24th part of an ounce. The term had the same use among the Latins. Among English-speaking people it refers to weight only, the scruple being a third of a dram or the 24th part of an ounce apothecaries' weight, equivalent to 20 grains Troy. The term is not to be confused with scruple, meaning hesitation or uneasiness, save that both words are related to *scrupulus,* a Latin term meaning a sharp stone, a grain of sand, and doubt.

Scudder, Horace Elisha (1838-1902), an American author. He was born in Boston, educated at Williams, and died in Cambridge. He started in life as a teacher and tried business but soon gave himself to writing. He was the author of several juvenile volumes including *The Bodley Books,* 1875-87. He was a contributor to the *Atlantic* and edited it 1890-8. He edited the American Commonwealths Series, and wrote, among other volumes, *Noah Webster, a Biography, Men and Letters,* and *James Russell Lowell, a Biography.* Mr. Scudder's greatest service to letters, but a service that can never be estimated, was a persistent and an able advocacy of literary wholes, juvenile classics, for school use. To this end he edited the Riverside Literature Series, an extended series of inexpensive volumes for use as school readers. The series includes not only the masterpieces of British and American authors, but Mother Goose and other nursery rhymes.

Scudo, a silver coin current in Italy during the seventeenth and eighteenth centuries. The name means shield, and was derived from the heraldic shield, which it bore, of the prince who issued it. The scudo varied in value from 96 cents to $1.05. In 1859 Pope Pius IX struck a gold scudo worth $1.03. The present Italian coin of value is the lire, worth practically $5.

Sculpin, a name popularly given to unshapely and repulsive fishes of different genera. The yellow sculpin belongs to a different family from the daddy sculpin, and it again is not the same as the common grubby of the New York and the New England coasts which rivals it in ugliness. All are unshapely with very large spiny heads, wide mouths, and slender, tapering bodies. These sculpins are of a dull, mottled color and are found in coast waters, both of the Atlantic and the Pacific, being especially abundant on the western coast where they are used sometimes by the Indians for food although held in contempt by the whites. Still another sculpin is the deep-water sculpin, or sea-raven. It is particularly hideous and is distinguished by a long, irregular dorsal fin, having about seventeen spines.

Sculpture, the art of shaping figures. The figures may be cut in stone, molded in clay or wax, or they may be formed by casting plaster of paris or bronze in a mold. A figure which stands out completely is said to be in the round. When the figure projects a half from the surface, it is said to be in high relief. When it projects slightly, it is in low relief. If the figure be scooped out of the material, as in the case of an intaglio, it is in hollow relief. Sculpture in wood is called carving. The designing of coins and medals and the art of cutting gems, that is to say, cameos and intaglios, are branches of sculpture; but, as ordinarily used, the term covers only modeling, mallet and chisel work, and casting figures in bronze and other materials. A human figure in the round is known in art as a statue. A head only or a head and chest is a bust. A body without head, arms, or legs is a torso. Owing to the enduring character of the material used, we have a more accurate knowledge of sculpture than of any other art practiced by the ancients. We are obliged to guess at their painting and to reconstruct their buildings from fragments, but many pieces of sculpture amid debris come out of the ruins little the worse for the centuries.

The Egyptian sculptor used marble, both white and colored. He carved colossal figures out of black porphyry, one of the hardest stones known. The Egyptians adorned the walls of their temples and tombs with sculpture. The Ninevites were famous for doorway figures and colossal combinations of eagle, lion, and man. The Greeks are supposed to have surpassed all other nations, ancient and modern, in this form of art. Phidias and Praxiteles, their greatest sculptors, used Parian marble, from the Isle of Paros, and Pentelic marble, from Mount Pentelicus. Sufficient traces are left to show that both Greeks and Egyptians colored their statues. The favorite subjects of the Greek sculptors were statues of the gods and heroes, and temple friezes portraying mythological battles and scenes from the lives of their heroes. The Etruscans were masters of modeling in terra cotta. The Romans depended on Greek sculptors for their statues. The sculptors of the Middle Ages expended the greater part of their effort in adorning the portals, galleries, and altars of the cathedrals with Biblical subjects. Some cathedrals have several thousand distinct pieces of sculpture.

Modern sculptors use the white marble from Carrara, Italy, for chisel work. Most modern statues, however, are bronze casts. The most notable statuary of European and American cities consists of statues of noted persons designed to ornament public squares and parks. Groups expressive of an event are less frequent in America than in Europe. The national capital has many public memorials. There is not a little notable work in the various national buildings. Many critics think that Augustus St. Gaudens is the greatest artist the United States has produced. His best productions are the Shaw memorial in Boston Common, the Puritan at Springfield, Massachusetts, and Lincoln in Lincoln Park, Chicago.

To make sure of what he wants to do, the sculptor who works in bronze prepares first of all a small model in clay. He next makes a full size and exact model in clay. This

he makes the subject of deep study and care, for the bronze, when cast, will be exactly like it. When the artist's clay model is complete, the work of making a plaster model for the cast begins. The clay model has been kept moist by sprinkling and swathing in damp cloth. Fences of tin made of strips about four inches wide are set up. The edges of the tin are simply stuck into the clay. These divisions run around the waist, up the back and down the front and over the head, along the arms and legs,—wherever experience has shown they may be necessary. Plaster of paris of the finest consistency is then clapped on the model with the bare hand until a coat a quarter of an inch thick has been formed. The plaster is thickened to half an inch. This done, pieces of small iron piping and wire are bent suitably and pressed into the plaster, for the workman is making a mold that requires strength as well as shape. Plaster is built over the iron work until the whole coating is from two to six inches thick, according to the amount of strain the part must bear in handling. The plaster of paris mold is then taken off in sections. The strips of tin now show their usefulness. Any portions of clay, as ears, broken off in cavities of the plaster mold, are dug out carefully. The sections of the mold are cleaned, painted if necessary, then greased well inside, and coated within with a film of plaster and lined with burlap. They are then put together, forming a hollow statue. A small amount of liquid plaster is poured in, as into a jug. The mold is rolled about so that the plaster may coat all parts of the inside. When this has dried, the operation is repeated again and again until the interior is coated to a depth of several inches and many parts filled solid. After hardening sufficiently, the outside mold is chiseled away, leaving a plaster of paris model like the original clay model. The burlap mentioned lies half an inch beneath the surface and gives strength.

The model now goes to the bronze foundry. The caster makes molds from the model, into which he runs his molten metal, much as castings for stoves are made. A statue of a man is cast usually in five pieces, the bust, the right arm, the left arm, the lower part from the waist downward, and the plinth on which the figure stands. These parts are doweled together. Thus we have the artist's small model, the full size clay model, the plaster of paris mold, the plaster model, the caster's mold, and finally the bronze statue.

The worker in marble has a different task. The clay modeler may repair and alter at will, but stone cannot be replaced. The slightest slip of the chisel and the work is ruined. Some sculptors in stone prepare a clay model to serve as a pattern. Michelangelo set a dressed block of marble on a convenient support and fell at work apparently in the most reckless way. His mallet swung as carelessly as though he were unconcerned. Chips of marble flew from his chisel; then, as his imprisoned statue began to make its escape from the marble block, his face lit up wonderfully. The finishing work was done with eager reverence. Many of the masters employed students to rough out the work, putting on the last touches themselves, and some, with many orders, contented themselves with making models for students to execute. Thorwaldsen's Lion of Lucerne was chiseled in the cliff by workmen guided by Thorwaldsen's model.

Scurvy, a disease which breaks out wherever people are confined with improper food, as in armies, prisons, workhouses, and on shipboard. Some have thought that it is due, like smallpox and other epidemics, to some bacterium or minute animal; and others that its cause is simple want of proper nutrition. About one-seventh of the deaths occurring during our late Civil War from causes other than wounds were attributed to scurvy. A long continued diet of bread and salt meat alone is held responsible for most of the scurvy aboard ships. The best cure seems to be a vegetable diet. Cranberries are a preventive. Since the addition of canned vegetables, lemons, lime juice, and similar articles to ships' stores, sailors are seldom seized by scurvy. In the case of an individual attacked by this disease, physicians recommend exercise, fresh air, and sunlight, with a diet of potatoes, onions, fresh meat, and milk and eggs, with all the lemons and oranges the appetite craves. See KERGUELEN LAND.

—Nellie Walker.

"How beautiful is youth! How bright it gleams
With its illusions, aspirations, dreams."

THE THINKER—*Rodin*

Scutching, in the manufacture of textiles, a name given to certain processes applied to raw fiber preparatory to carding. The scutching of flax separates the fibers from the woody particles adhering to them. The process is performed by means of a simple machine which beats off the woody particles. The scutching of cotton separates the fibers after they are opened up, cleanses them from fine foreign litter, and spreads them in a wide lap ready for carding. The scutching of silk disentangles and straightens refuse silk preparatory to carding.

Scylla and Charybdis, sĭl′a and ka-rĭb′-dĭs, a promontory and whirlpool on opposite sides of the Strait of Messina, Italy. Scylla is a rocky promontory at the western extremity, the toe, of the mainland. According to legend, it was the haunt of a monster of that name having twelve feet and six long necks and mouths, each mouth armed with three rows of sharp teeth. It barked like a dog. In reality, the promontory, while formidable, no doubt, to the ships of the ancients in time of storm, presents no unusual obstacle to the passage of modern ships. Charybdis is a dangerous whirlpool at the opposite side of the strait, off the coast of Sicily. It is a rapid eddy of dark waters caused by conflicting tides. Even to this day sailors aim to keep out of it. In mythology, it was represented as the home of a monster with upper parts like those of a woman and lower parts like those of a fish or serpent. The whirlpool is situated outside the harbor of Messina, not directly opposite the promontory. In the Homeric legends, the monsters are represented as situated so near together that unlucky sailors, aiming to keep out of reach of the horrid mouths of Scylla, were engulfed in the dark depths of Charybdis. "Between Scylla and Charybdis" is a traditional expression for a situation with implied danger on either hand.

Scythe. See REAPING.

Sea-Anemone, a marine animal allied to the corals. The common sea-anemone is a hollow cylinder attached by one end to the bottom of the sea, while the other is surrounded by a forest of outward-bending, plume-like, richly-colored filaments. In the center is a mouth into which it is the business of the filaments or tentacles to drag small fishes or marine insects. Looking down into the sea one can hardly believe that he is not looking at upturned sunflowers, anemones, chrysanthemums, and other flowers. If the animal be disturbed, the stem shortens down to the point of attachment, the tentacles are drawn within and protected by a circular, dingy muscle that closes over them, like the mouth of a handbag, leaving scarcely an aperture at the center. When all is quiet, the stem elongates, the cover relaxes, the tentacles steal out, and the sea-anemone is in bloom again. If food becomes scarce most sea-anemones have the power to detach themselves and to locate elsewhere.

Sea-Cucumber, a marine animal related not distantly to the sea-anemone, starfish, and sea-urchin. In external appearance the cucumber looks like a fat worm, but the skeleton of the starfish is represented by a tough, muscular body wall, in the skin of which scales, plates, wheels, and anchors of lime are scattered. The sea-cucumber feeds on minute animals and organic particles extracted from the sand. A repulsive species inhabits the coral reefs of Malaysia. The stout, worm-like individuals attain a length of six to twenty-four inches. The bodies are slit and dried for food. Under the commercial name of trepang, large quantities are imported to the markets of the Chinese, by whom a bowl of trepang soup is regarded as a luxury.

Sea-Horse, a small, ashen gray, bony fish covered with armor-like scales extending to the end of a long, rounded tail. Its armor is covered with tiny spangles or scales that shine like silver. The entire fish is about five to eight inches in length and is noticeable in three respects. It swims upright; it carries its head with a peculiar arch of the neck like that of a horse, and it uses its long tail like a monkey or an opossum to cling to objects for support. Sea-horses are interesting in aquaria. Dried specimens are a standard article of sale in seaside curio shops.

Sea Raven. See SCULPIN.

Seal, sēl, a family of marine animals, including the fur seal, the hair seal, the sea-lion, and the walrus. The seal family

is characterized by dog-like heads and massive necks, huge chests, and tapering hinder parts as devoid of a tail as a bear. Teeth, fur, and food indicate relationship in the distant past to the mink and otter kind, but a sea life has brought about marked changes. In the case of the seals, the swimming membrane or web found between the toes of the otter has been extended until the entire foot is inclosed in a broad, flat sac with small, nail-like claws where the ends of the toes ought to be. These changed legs or flippers, as they are called, serve as paddles and enable the seal to swim and dive with marvelous speed and grace. They are jointed, of course, at the wrist and heel, but are peculiarly flexible like the fin of a fish, and may be bent to the body forward or backward. The palm of the front flipper is bare and is crisscrossed by wrinkles in a diamond fashion that enable the seal to lay hold of a slippery rock or cake of ice and haul itself ashore.

The life of the fur seal, from the fur of which sealskin cloaks are made, is exceedingly interesting. Formerly it was found by the million on antarctic shores south of New Zealand and the Cape of Good Hope, and especially on the coast of Patagonia and islands of that latitude. The persistent and unintelligent pursuit of a thousand sealing vessels has exterminated the seal in southern waters save in a few small rookeries where a hundred or two remain under protection. As late as 1835 a few were found on the islands off the coast of California, but the fur seal, slightly different, it may be, is now confined practically to four isles in the North Pacific, St. Paul and St. George, two of the Pribilof Islands in Alaskan waters, and two small islands 700 miles to the westward in Russian waters where it breeds under protection. Cool waters, a thick, heavy fog that rolls up from the sea in May and stays all summer, a low temperature seldom rising to 50°, drizzling cool mist, and shingly, well drained reaches of shore free from sand, mud, or puddles are found here.

The males, or bulls as they are called, reach their full size in seven years. They are then about six and one-half to seven and one-half feet in length and weigh 400 to 600 pounds. The bull has the face of a Newfoundland dog, with fine, expressive eyes, tightly drawn lips, sharp, fish-eating teeth, and a yellowish gray mustache that sweeps away to its shoulders like a pair of plumes. The front flippers are about eighteen inches in length from wrist to tip and are half as wide. The hind flippers are nearly two feet in length beyond the heel, which is straightened out so that they extend backward past the tail. In coming ashore the seal handles its front flippers skillfully, planting them like feet, but it is obliged to haul its body forward by arching or hunching its back. When alarmed it breaks into a lope for a few yards at a pretty good speed, but soon falls quivering with exertion and gasping for breath.

Early in May the huge bulls appear at the breeding grounds, fat, fierce, and full of fight, to take up their places on the coast where they await the arrival of the females or cows. Each preëmpts a plat of ground eight or ten feet square and defends it against all rivals. The bull remains quietly on his own plat two or three yards from his neighbor, unless disturbed by a newcomer who crowds in, then a terrible fight ensues. Two old bulls approach each other warily, with flaming eyes, each seeking the advantage; they fasten their teeth into each other with a grip that does not let go until fur, skin, and blubber come too. When the battle is over the weaker bull hauls on to some unoccupied place or perhaps measures strength with some other occupant of a desirable plot. The victor sinks down with a grunt of mingled satisfaction and contentment. He fans himself complacently with a flipper to cool his heated body, but with a sharp eye out to see that no neighbor encroaches on his domain.

After at least a month of this waiting and guarding, all the time without a mouthful of food, the bulls are thrown into a pitch of excitement by the arrival of the cows, meek, slender, beautiful creatures about one sixth of the size of the male. A terrific hurly-burly sets in. The cows come ashore in troops and platoons, seeking a place of quiet to have their young. Each bull endeavors to have as many as possible camp down with him. While a bull near the shore is reaching for a new recruit, bulls at the rear are reaching into his yard and lift-

SEA-ANEMONES

ing out the cows by the nape of the neck as a cat does her kittens and at the same time they are being robbed by those further back, and so on to the fifth and the tenth and the twentieth station in the rear. The noise at this season is terrific. The coughing, spitting, and roaring of thousands of bulls may be heard six miles off the fog-bound coast and lets the navigator know that it is time to cast anchor and feel his way in.

As soon as a cow obtains a moment of quiet she gives birth to a single black-haired pup about the size of a muskrat. The rookery, as a breeding ground is called, is literally thronged with a mass of cows and pups through which the excited bulls charge and fight for a week or two, keeping their cows at home, and driving their rivals away. Mr. H. W. Elliot, whose observations were published in 1880, tells of one bold fighter who maintained his chosen place at the edge of the water in forty pitched battles. At the end of six weeks he was a bloody, bitten, torn old chap, minus one eye, flippers torn to shreds, and hide lacking by the mouthful, but happy, lording it like a king over a little herd of fifteen cows and their pups. Strangely enough few pups are killed, although they are squeezed flat often enough.

After the males have become completely exhausted by weeks of fasting and fighting, they subside. The cows go out to sea hundreds of miles for food, but return every few days to suckle their young, which each recognizes by its cry, though a quarter of a million pups are bleating at the same time. The pups are ready to suckle any mother, but she will have none but her own, so none go hungry. In the absence of their mothers, the pups roll and play and tumble down to the shore. When they first fall into the water they nearly drown, the big head and shoulder end of the body insists on pointing downward, but by degrees they learn to use their flippers to keep their heads above water. Toward the end of the season, the old males, once covered with blubber and fat as butter, but now reduced to living skeletons, haul down to the shore and slide off into the sea to seek food. The mothers and rolling fat pups follow. When winter sets in the rookeries are without an occupant. The seals, big and little, are scattered over the North Pacific from Japan to Oregon pursuing fish.

The seal has a large chest and lung capacity, enabling it to breathe so much air that it is able to dive for a long time and to great depths, no doubt several hundred feet. When satisfied with food the seal at sea lies on its back, folds its flippers comfortably against its body, and sleeps with just the tip of its nose and stub of its tail out of the water. Kipling describes the slumber of the young seal in *The Seal's Lullaby* in beautiful language:

O! hush thee, my baby, the night is behind us,
And black are the waters that sparkled so green,
The moon, o'er the combers, looks downward to find us
At rest in the hollows that rustle between.
Where billow meets billow, there soft be thy pillow;
Ah, weary wee flippering, curl at thy ease!
The storm shall not wake thee, nor shark overtake thee,
Asleep in the arms of the slow-swinging seas.

The taking of sealskins is not a pleasant theme. When the males have taken their position in the spring, young seals are not allowed to land. The young males, especially, know enough not to make the attempt until they are six or seven years old. These *holluschickie,* a word meaning bachelors, and the young cows land elsewhere on suitable grounds. The natives, three or four hundred of whom live on the seal islands for the purpose, get between a band of bachelors and the sea, usually before daylight, and drive them inland at the rate of half a mile an hour to the villages, where they are killed with clubs. Their skins are piled up in the mows of fur houses close at hand, first a skin, hairy side down, then a heavy sprinkling of salt, then another skin until a bin is full. Elliot states that, in 1874, 84 men secured 90,000 skins in 39 days. They get forty cents a skin for the work and expect to take off fifteen in an hour. Cut skins are rejected.

At the close of the season the salted skins are mated and put together, two and two, hair outside. Each pair is rolled up and corded into a little bale weighing from nine to twenty-four pounds for the two skins according to age. The skins of males only, two to six years old, are desired. In load-

1. Harbor seal.

2. Greenland seal.

Sea elephant.

Hooded seal.

THE SEAL AND RELATIVES.

ing and the reverse the bales are tossed from hand to hand, and are shipped by boat and rail *via* San Francisco to New York or over the Panama route to London, where they are sold at great annual fur auctions.

Tanning and dressing is done to best advantage in Europe on account of the cheapness of labor. About three skins are necessary for a lady's sacque. The difference in price is due more to difference in workmanship than to difference in original quality. Seal fur is far from handsome at the outset. It is so thick that the seal can live in water without getting wet. The hair is of two lengths. The longer hairs are plucked out by being caught between the workman's thumb and a knife edge. The short fur is colored by dye applied from day to day with a brush. A well dyed sealskin cloak will not discolor a white collar or soil the most delicate fabric even when wet.

Formerly the United States limited the taking of seals to a single company allowed to kill 100,000 seals a year, and the Russians followed a similar plan. However, seal skins became so valuable that seal poachers, as they were called, followed the seal in the summer season into the open sea and shot them. The seals so killed were females and for every mother seal shot a pup starved to death. Since this poaching was carried on in the open sea, that is, waters outside the jurisdiction of any government, it was difficult to stop it. Finally, through an agreement between the United States, Canada and Great Britain, the killing of seals on the Pribilof Islands was prohibited for a number of years. Taking of seals was resumed under strict government supervision in 1918, when about 35,000 males were killed. Most of the skins are now dressed in the United States instead of being sent to London. The seals on the Pribilof Islands were counted in 1920 under supervision of the United States government and it was found that the herd comprised over 500,000.

Aside from the fur seal, other seals of importance are the Greenland seal, a hairy seal, chased for its blubber. It is naturally an important animal in the life of the Eskimos, who depend on its flesh for food, its blubber for heat and fat, and its sinews for thread. It is followed by a fleet of half a hundred ships for the sake of the oil tried from its blubber. Its fur is not valuable. The harbor seal is a small, docile seal worthless for commercial purposes, but a welcome animal in Atlantic harbors. The sea-lion, a huge animal twice the size of a fur seal, is of importance to the Aleut Indian. A traveler tells of seeing a squaw take away the choicest parts of a sea-lion, of which the following use was made. The gullet was used for a boot leg; the palms of the front flippers were used for boot soles; the stomach was blown up like a bladder and dried for an oil jar or oil bag; the small intestine, sixty feet long, was stretched from stake to stake clear of the ground, slit from end to end, cleaned, pressed flat, dried, and cut up into pieces suitable for making a waterproof cloak. The sinews of the back were used for thread to make the cloak. The liver and the leaf lard were saved like those of a calf for eating; the gall bag was kept to poultice a scrofulous sore; the hams and loins were hung by the hind flippers to dry for meat; and the bristles of the mustache were pulled out and saved for sale to the Chinese by way of San Francisco for probers for their opium pipes. So much for the sea-lion or big seal.

See WALRUS; MANATEE; PORPOISE; WHALE; FUR.

Seal, a piece of wax bearing the impression made by a die. The name is given also to the die with which the impression is made. Sealingwax is made of various materials. Beeswax, shellac, Venetian red, turpentine, and resin are common materials. Vermilion is a favorite pigment. The face of a die or seal resembles usually that of a coin. Formerly the seal took the form of a signet ring, the die being cut on a raised portion of the metal or preferably on the gem with which the ring was ornamented. Letters and other documents were fastened with tape, the ends of which were brought together and imbedded in a piece of wax on which the die was impressed. It was impossible to open such a packet without either cutting the string or breaking the seal. The letters which Cicero's guards took from Catiline's messengers were sealed in this way. During the Middle Ages it was customary to authenticate

documents by attaching seals to them, appended usually by the aid of a string. Later the wax was laid on the paper and stamped. At the present time the seal has degenerated into an impression made by the notary's stamp in the paper itself. To documents of dignity and importance, however, as passports and other state papers, the formality of affixing a red or blue disc of paper is still observed. Within the remembrance of people still living, the envelopes of ordinary correspondence were fastened with sealingwax or wafers. The custom is still permissible for polite correspondence, but, in general, letter seals have been superseded by gummed edges. See RING; WAX.

Sea Lion, one of the several large-eared seals or otaries. It is a hair seal, not a fur seal. A related species is known as the sea-bear. See SEAL.

Seance. See SPIRITUALISM.

Search, Right of, in international law, the right of belligerent ships to stop and board a merchant vessel with a view to ascertaining its nationality and destination and the nature and ownership of its cargo. If it be found that the merchantman is aiding the enemy it is liable to capture, and though it be engaged in peaceful, legitimate traffic, it is liable to seizure if it fails to stop when ordered to do so. Except in case a merchantman is suspected of violating the revenue laws of a nation, it is not permitted to exercise the right of search in peace times.

When a warship wishes to halt a merchant vessel it fires a cannon containing a blank charge. Failure on the part of the merchant ship to heave to when this order is given renders it liable as above indicated. A searching party, the size of which is usually regulated by international agreement, boards the cargo carrier and looks, first, at the ship's papers. These should contain all the information desired by the searchers, and it is only when they do not that the cargo is actually examined.

At the Hague Conference of 1907 it was provided that the mail carried by neutrals should be free from molestation, and that if a neutral ship carrying mail were seized, the mail should be despatched as soon as possible. This and some other clauses were temporarily ignored by Great Britain during the World War, and Germany, in its submarine campaign, ignored almost all provisions of the regulations governing the right of search.

Search Warrant, a writ issued by a justice or court directing a constable or other officer of the law to search certain premises for stolen goods, gambling devices, or other questionable property. A search warrant may be issued only on the testimony of some apparently responsible person under oath that he has good reason to believe that the property may be found on the premises. The United States Constitution provides that the warrant shall describe accurately the place to be searched and the articles to be seized. An officer having a warrant for the arrest of a criminal may enter premises where he believes the fugitive to be. A warrant to search one building gives no warrant to enter another. Under a despotic government, officers feel at liberty to search any home at any time, but in free countries a man's house is his castle. Even the king of England has no authority to enter the home of the humblest peasant without permission. Both courtesy and law require that a visitor "knock at the door and obtain permission before entering." See WRITS OF ASSISTANCE.

Sea Serpent, a more or less hypothetical serpent of great length, thought by some to inhabit the deep sea. There are numerous marine serpents inhabiting tropical waters. They are all venomous. They live on fish, which they pursue in the water. They give birth to their young on rocky shores. So far as scientists are informed, none of these serpents exceed five feet in length. Various rock formations, particularly limestone, once at the bottom of the sea, contain the fossil remains of serpent-like animals up to seventy feet in length. There are numerous seemingly well authenticated reports of huge serpents seen at sea by sailors from different countries. In 1848 a sea serpent was reported by the officers of a British brig off the coast of Africa. It was said to have a diameter of about fifteen inches behind the head, and to have, at a moderate estimate, a length of not less than sixty feet. According to the report given, it passed very near the ship and had the form

of a large serpent or eel. Various explanations of these and hundreds of other reports have been given.

Tide rows of seaweeds acquire an undulatory motion by reason of the waves, and may be mistaken for sea serpents.

Seasickness, a nervous affection attended by nausea, vomiting, and other disagreeable sensations, produced by the motion of the sea. There are many probable causes but as yet they are imperfectly understood. It may be owing to irregular visual impressions due to rocking, or to irritation of the liver by the unusual bodily movements. This derangement reacts upon the nervous centers, and through them upon the viscera, thus producing the nausea. Many preventive measures have been suggested, but they are not always effective. A person should not overload the stomach, should take plenty of exercise in the open air and keep the bowels regular. Persons who are inclined to seasickness sometimes escape by remaining in a horizontal position as much as possible during the voyage.

Seasons, the annual recurrence of spring, summer, autumn, and winter. The change of seasons is due to three facts:

1. The earth swings around the sun once each year.
2. The various positions of the axis on which the earth turns daily are parallel.
3. The earth's axis inclines to the earth's annual path at an angle of 23½°.

During one-half of the earth's annual trip the northern hemisphere receives more than its share of light and heat from the sun. During the other half of the year the southern hemisphere receives the greater share. If the earth remained in one place before the sun, we still might have night and day but no changes of seasons. If the earth's axis changed direction, or wobbled, we should have irregular changes of weather. If the earth's axis were perpendicular to its path around the sun, we should have night and day only, without change of season. If the angle between the axis and a perpendicular position were greater we should have a longer, hotter summer and a longer, colder winter, with a shorter fall and spring.

Astronomically spring begins March 21st with the vernal equinox and ends at the summer solstice, June 21st. Summer extends from the summer solstice to the autumnal equinox, September 22d; autumn, from the autumnal equinox to the winter solstice, December 22d; winter, from the winter solstice to the vernal equinox. According to the calendar, March, April, and May are the spring months. If we reckon from the same astronomical date, the seasons in the southern hemisphere come in the reverse order,—fall, winter, spring, and summer. This brings the southern summer at the time of the northern winter, etc.

Theoretically spring and autumn should have the same temperature. A given locality is exposed to as much sunshine in the spring as in the fall, but a large amount of heat is carried over from the summer into the autumn. Early autumn is warmer than early summer, and early winter is warmer than early spring.

The earth travels in an ellipse, and is nearer the sun in one part of its yearly path than in the other. The earth is nearer the sun during northern winter than in summer. The earth passes through the nearer portions of its orbit, that is, from the autumnal to the vernal equinox, in 179 days, but spends 186 days in passing through the other part of its course from the vernal to the autumnal equinox. Our northern summer, therefore, is a week longer than our winter. Our nearness to the sun makes our winter a trifle milder, and it is cut short by a week which has a still greater effect. Our summer is a week long, but the extra length is about offset by our greater distance from the sun. In the southern hemisphere the winter comes in the long part of the orbit. The effect of an extra week in length is increased by the greater distance from the sun. The southern summer is a week short, but the nearness to the sun ensures a fierce midsummer heat. As compared with northern seasons, the seasons of the southern hemisphere show greater extremes. The summer is shorter and hotter. The winter is longer and colder. Southern autumn comes at the time of northern spring, southern summer at the time of northern winter, etc.

The farther a region is from the equator, the greater the difference between summer and winter temperatures, and the greater the difference between the length of the summer and the winter day. In tropical countries there is little variation in the length of day or in temperature. The different seasons are marked chiefly by a difference in rainfall.

Seattle, the metropolis of Washington and the county seat of King County, is the largest city north of San Francisco and west of Minneapolis. It is the nearest American port to Alaska, Japan, China, Philippines, Siberia and Asiatic countries, and is situated on Puget Sound, an arm of the Pacific Ocean, 125 miles south of the international boundary and 864 miles north of San Francisco. Seattle lies between the Olympic and Cascade ranges and these, together with the influence of the Japanese trade winds give the city a mild year around climate. The maximum temperature in 1922 was 88 degrees and the minimum 21 above. Snow is uncommon. The average rainfall is 33 inches, the same as for Chicago. The death rate for the last 15 years has averaged 8.6 per 1,000 population, the lowest in the nation.

DESCRIPTION. Though Seattle is, by comparison with most large American cities, hilly, some places having an altitude of 500 feet, the streets are generally broad and well paved and cross each other at right angles. As in many other city-ports, the manufactories line the water, the commercial section lies farther back, and on the hills overlooking the ocean and the lakes, are the best residential districts.

Seattle has more than 1,800 acres of parks, and within the city limits are Lake Union, Washington and Green lakes. The principal parks are Woodlawn, Ravenna, Kinnear, Madrona, Washington, Jefferson and Volunteer. At Alki Point is a beautiful beach; the municipal conservatory is in Volunteer Park; Ravenna Park has mineral springs and small cascades; and in Woodland Park is an athletic field and a zoological garden. Besides the numerous public parks the city maintains upward of 20 supervised playgrounds.

The most conspicuous building is the 40-story L. C. Smith building, which is outranked in height only by the Woolworth building, New York City. Other attractive structures are the Hoge, Dexter-Horton, Metropolitan and Cobb buildings, Olympia Hotel, a community enterprise, King Street passenger station, St. James Cathedral, Telephone building, Federal building, public library, city and county buildings, Metropolitan, Moore, Wilkes and Orpheum theaters, Washington Hotel and the buildings of the University of Washington. The First Presbyterian, First Baptist and Christian Science churches are also noteworthy.

INSTITUTIONS. The public school system comprises graded and high schools that are modern in every detail, and the city is the seat of the University of Washington, already mentioned, which is described in the article on the state of Washington under the subtitle *Education*. Other educational institutions of note are the College of Our Lady of Lourdes, Seattle College, Washington Preparatory School for Girls, Adelphia College and Academy of the Holy Name. There are also a number of commercial and special schools, including the nationally recognized Cornish School of Music, dancing and fine arts. The library system comprises the main library and ten branches.

The municipal and county hospitals are the largest in the city; others are Providence, Swedish and Miner. There are charitable institutions, including asylums for orphans and for the aged.

INDUSTRY AND COMMERCE. Seattle is at once the most important industrial, shipping and commercial center and seaport in the Pacific Northwest. The manufacture of flour and grist-mill products, and lumber and timber products and metal products are the most important industries, and during the World War the steel ship industry was particularly important. The city has hundreds of manufactories, large and small, some products of which are finished lumber, doors, sash, fish products (especially canned salmon), dressed meats, flour, machine shop and foundry products, leather goods, machinery and printed matter.

MARINE AQUARIUM

1. Pecten. 2. Murray Cod. 3, 6. Sea Squirt. 4. Conger Eel. 5. Climbing Snail. 7. Dogfish. 8. Venus' Girdle. 9. Venus' Slipper. 10. Salpa. 11. Jellyfish. 12. Cuttlefish. 13. Loligo. 14. Hairstar 15. Octopus. 16. Sponge. 17, 27, 32. Coral. 18. Hermit Crab. 19. Stingfish. 20. Sea Cucumber. 21. Gurnard. 22. Cocoanut Crab. 23. Spider Crab. 24. Sea Crayfish. 25. Ray. 26. Surmullet. 28. 31. Starfish. 29. 30. Tubeworm. 33. Sea Hare. 34. Sea Urchin. 35. Torpedo. 36. 37. Sea Anemone

The country tributary to Seattle is rich in timber and minerals; the agricultural land is highly productive; and there are valuable deep sea and river fisheries

Seattle is a western terminus of the Union Pacific, Northern Pacific, Great Northern, Milwaukee and Burlington railroads and also has direct through service with the Southern Pacific, the Canadian Pacific and the Grand Trunk lines. Puget Sound is where the Japanese, British and American shipping lines contest most sharply for trans-Pacific business and Seattle is the operating base for the American Merchant marine trans-Pacific passenger and freight lines and one British line, all operating to China, Japan and the Philippines. Seattle is the only American port having regular year around passenger and freight service to Alaska. The harbor is landlocked and commodious, and a deep water canal connects Lake Washington, by way of Lake Union, with Puget Sound. Public docks, warehouses, cargo derricks, cold storage plants and other harbor equipment have been installed and are continually undergoing improvement, and the importance of the port constantly increases. The Washington customs district, of which Seattle is the chief port, ranked fifth in the United States in 1922. Raw silk, gold, tea, hemp, oriental vegetable oil and general merchandise are the principal imports.

HISTORY. In 1852 the first settlement was made here, and the town was planned in 1853. In 1865 it was incorporated as a town, and as a city in 1869. The first Alaskan gold was received here in 1897, and thereafter the city's growth was rapid. One of the prime factors conducing to its growth in the twentieth century was the Alaska - Yukon- Pacific Exposition, held June 1,-October 16, 1909. In 1910 the population was 237,194; in 1920 it was 315,312.

Sea-Urchin, a general name for a large group of marine animals belonging to the class known as echinoids. All are more or less cylindrical. Some species are so flattened as to be called sand-dollars, cake-urchins, etc. Like the starfish they inhabit shores and move sluggishly by means of tube feet and spines. They live chiefly on sea weeds and organic matter found in mud and other deposits. The more or less spherical body is protected by ten radial plates that run from pole to pole. Five of these plates bear tube feet; five bear spines varying from mere prickles to spines several inches in length or, in some species, becoming clubs. The sexes are separate as in the case of fishes. The larva is known as pluteus. The shells of sea-urchins are often brightly colored. They are offered in seaside curio shops. The California Indians eat a Pacific species. The common European sea-urchin has long been an article of food. See STARFISH.

Sea Water. It is well known that the water of the ocean is much denser than fresh water, owing to minerals in solution. Few people have any idea, however, of the large amount of mineral matter that has been washed out of the lands by rains and carried by streams to the sea. The ocean covers about 145,000,000 square miles. The average depth is thought to be not far from two miles. In that case, the cubical content of the ocean is not far from 290,000,000 cubic miles. The following statistics relating to the contents of a cubic mile of sea water are gleaned from an interesting article contributed by F. E. Mariner to *Popular Mechanics:*

Cubic feet	146,197,952,000
Weight, tons	4,460,544,000
Gold content at 1 grain per ton	$178,421,700
Common salt, tons	117,089,280
Value, at $5 per ton	$585,446,400
Magnesium chloride, tons	14,050,713
Value	$280,000,000
Potassium chloride, tons	5,520,285
Value	$220,811,400
Gypsum, tons	7,181,475
Value	$20,000,000
Bromide of sodium, tons	1,717,209
Value	$858,604,500
Total mineral value of cu. mile	$2,143,484,000

Seaweeds. See ALGAE.

Sebastopol, or **Sevastopol.** See CRIMEA; BALAKLAVA.

Secession, sē-sĕsh'ŭn, in American history, withdrawal from the union of states. The theory that a state retained the right to withdraw did much, no doubt, to gain the consent of the various states to form the "more perfect union." The doctrine of secession has nothing unholy about it. It has been popular at one time or another in various sections of the original thirteen states.

Dissatisfaction with the War of 1812, on account of which their ships lay rotting in harbor, led the Federals of New England to make threats of withdrawal. In 1832 South Carolina, angered by the imposition of a tariff favorable to New England interests, took preliminary steps to leave the Union. In 1860-61, following the election of President Lincoln, the following states seceded:

South Carolina	December 20, 1860
Mississippi	January 9, 1861
Florida	January 10, 1861
Alabama	January 11, 1861
Georgia	January 19, 1861
Louisiana	January 26, 1861
Texas	February 1, 1861

These states formed a confederacy February 4, 1861. After the attack on Fort Sumter, four more states seceded.

Arkansas	May 6, 1861
North Carolina	May 20, 1861
Virginia	May 23, 1861
Tennessee	June 8, 1861

Opposition to secession was strong in some of these states. The federal government took no official notice of the several ordinances of secession. So far as official recognition went, the armies of the South were treated as bodies in armed rebellion, orderly mobs. The stronger part of the nation prevented secession by force of arms. The idea of secession is not confined to the United States. Early in the seventies British Columbia threatened to secede from the Dominion of Canada unless the building of the long promised Canadian Pacific should be agreed upon definitely. In 1906 West Australia, the third state in size of the Commonwealth of Australia, passed an act of withdrawal, the cause being the apparent abandonment of a promised east and west transcontinental railway. The stigma that rests on American secession arises from the impossibility of separating the issue from the policy of African slavery.

Secondary Schools. See HIGH SCHOOL; SCHOOLS.

Secord, Laura a Canadian woman whose heroism resulted in the defeat of the Americans and the victory of the British at the Battle of Beaver Dam, in 1813, during the War of 1812. At Beaver Dam, midway between Stoney Creek and the Niagara River, the British had stationed a force of 50 regulars and 500 Mohawk Indians. The husband of Mrs. Secord, a wounded militia officer, overheard the Americans planning the capture of this force; he could not send a warning, but his brave wife offered to go. Driving a cow before her until she reached cover, so as to allay suspicion, Mrs. Secord then tramped twenty miles through dense forests until she reached the British. The Americans came up quietly, expecting an easy victory; but the surprisers became the surprised, and the American commander surrendered.

Secretary Bird, an African bird of prey, otherwise known as the serpent-eater or crane-vulture. Its common name is derived from the appearance of its crest, which, when the bird is not excited, lies smoothly on the head, not unlike an old-fashioned quill carried above the writer's ear. The secretary bird is about four feet in length, and is of an ashy gray color with black portions of plumage. It has a large capacity for serpents, being able to eat several snakes two or three feet long. It attacks by dealing blows with its wing as the serpent endeavors to strike.

Secretary of State, War, etc. See CABINET.

Secretion, in animal physiology, a substance separated usually from the blood by glandular activity. Secretions are of two kinds—helpful and detrimental. The urine is a detrimental secretion. Detrimental secretions are called excretions. The glands, which may be defined as groups of cells, occupied in extracting liquid or semi-liquid substance from the blood, have no power to manufacture. They simply collect material from the blood. The salivary glands collect saliva, the pancreas secretes pancreatic juice, the liver stores bile, and the mucous membrane supplies the alimentary canal with a moistening secretion known as mucous. The glands and secretions named, together with the gastric juice, may be grouped under the term digestive. Other secretions are the lymph, the synovial fluid, the oil of the hair, tears, perspiration, and ear wax.

Secret Service, in the United States, a

bureau maintained by the treasury department for the detection and prevention of crime. The bureau was organized for the detection of counterfeiters, smugglers, illicit distillers, and others attempting to defraud the treasury department. Since the assassination of President Lincoln the president of the United States has generally been attended by members of the secret service, or plain-clothes men, as they are called, to protect him against assault. Secret service men guard the White House night and day. The service was extended under the administration of President Roosevelt in order that detectives might be employed, under the direction of the department of justice, to secure evidence against railroad and other corporations suspected of violating the anti-trust and interstate commerce laws. This extension of the operations of the secret service corps has been criticised. The United States secret service was not specially created by statute, nor are appropriations made for it directly. It is well understood, however, that its annual cost runs into the millions.

Similar bureaus to that of the United States are maintained in all civilized countries. A system of government espionage has long been maintained in France, being especially offensive in the reign of Napoleon III. In Russia persons suspected of entertaining revolutionary ideas are kept under surveillance, and constant vigilance is exercised by detectives as well as by the imperial police to protect the czar and the members of his government against assassination and to ferret out and frustrate the plots of anarchists and nihilists. In Germany the secret service is less active than in Russia, although the American visiting that country is likely to regard the government as unnecessarily inquisitive about his private affairs. Indeed the only European country where the stranger is not likely to be made to feel in many ways that his personal liberty is unduly restricted is the United Kingdom. Even there, however, secret service men are in constant attendance upon the person of the sovereign and members of his cabinet. To a greater or less extent they are employed in shadowing persons suspected of designs against the government or its officials, or of acting as spies of foreign powers interested in securing, by any means, specific knowledge of the military defenses of the kingdom.

Security, a legal term, meaning to render the enjoyment of a right or privilege more secure. Security is generally of personal or property nature. In personal security, the debtor or a third party offers a bond as a guarantee that the original agreement will be carried out. In property security, a mortgage is offered, and the creditor may hold the property until the obligation has been fully discharged.

Although most security is specific, there are also types of floating or shifting security. An example of the former is the chattel mortgage. Whenever the mortgagee makes demands for the property or institutes legal proceedings for the satisfaction of his just dues, the security becomes specific, and all shifting security vanishes.

Either the parties interested, or the law, may decide upon the security to be offered, and as a general thing the former plan is adopted. There is a state law which exempts public securities from taxation, but it has been decided that this will not protect the bonds of large corporations from a tax to the revenue from which the government is entitled. Only securities issued for the promotion of public works are exempt from taxation. Generally in strictly judicial cases, the security accepted varies in the different courts.

Sedalia, Mo., the county seat of Pettis County, is on the Missouri Pacific, and Missouri, Kansas and Texas railroads, 188 miles west of St. Louis. The principal industrial establishments are the shops of each of the railroads, and manufactories of brooms, agricultural implements, shoes, overalls, shirts, wagons, clothing, dressed meats and creamery products. Wheat, corn and hogs are the leading articles of commerce.

The most noteworthy features of the city are the state fair grounds, George R. Smith College (colored), Convention Hall, Carnegie library, Convent School of the Sisters of St. Joseph, Missouri, Kansas & Texas and St. Mary's hospitals and Liberty Park. In 1920 the population was 21,144.

Sedan, se-dŏn′, a manufacturing town of western France. It is situated on a small plain on the Meuse River, among the Ardennes Mountains. It has been noted long for the manufacture of fine cloth, an industry giving employment to 10,000 workmen. The city was the birthplace of the French Marshal Turenne, whose name has been given to the principal square. The sedan chair, a sort of covered chair or litter, fashionable in the age of Queen Anne, is supposed to have originated here. Sedan is noted especially as the scene of the surrender of a large army during the Franco-Prussian War. The Germans hemmed the French in, occupied the surrounding heights, and poured down a destructive fire of shot and shell, forcing the capitulation of Napoleon III. Thirty-nine generals, 230 staff officers, 2,600 officers, and 83,000 men in the ranks surrendered with him. A local museum has been established in which relics from the neighboring battlefields are preserved. A graphic account of the battle may be read in *Downfall,* by Zola, the French novelist. See NAPOLEON III; BISMARCK.

Sedge, sĕj, a large family of grass-like plants. The most important genus is known to the botanist as carex. A grass stem is usually round and hollow. A carex, or sedge, may usually be told from a grass by having a triangular solid stem. The seeds or nutlets are frequently flat or triangular. They are not inclosed by chaff, but by a bladder, or else a closely adherent sac. There are about 2,500 species in the world; about 300 in the United States. The larger sedges grow chiefly in the swamps. Some are taller than a man's head; others, especially the wood-carex, grow in soft tufts underfoot. The seed of this sedge is borne on a stalk so short that it must be sought at the very roots, often half buried in leaf mold. The genus is not a valuable one, though many species may be made into hay. The salt marsh hay of the coasts is a sedge. The umbrella plant and the Egyptian paper plant or papyrus are members of the sedge family. See GRASS.

Sedgwick, John (1813-1864), an American soldier born at Cornwall, Connecticut, and graduated from West Point in 1837. He took part in many engagements against the Indians in the West, and served in the wars against the Seminoles in Florida. He took part in the Mexican War, receiving promotion for gallantry, and in the Civil War where he made a brilliant record. He rose from the rank of lieutenant-colonel of artillery to that of major-general. He served with great efficiency in the Peninsular campaign. At Antietam he was severely wounded three times and disabled, but rejoined the army in time to be in the two battles of Chancellorsville and Fredericksburg. With the Sixth Corps he commanded the left wing at the battle of Gettysburg, having made a difficult forced march of thirty-five miles to reach the scene of battle. He took part in General Grant's famous Virginia campaign of 1864, and at Spottsylvania Courthouse was killed by a Confederate sharpshooter. A bronze statue of General Sedgwick has been erected at West Point to commemorate his deeds.

Seed, in botany, the matured ovule of a flowering plant. A seed, or a group of seeds, with the parts that contain it, is a fruit. A bean pod, with its contents, is the fruit; the beans are seeds. The hard, shelly pit of a plum is not the seed; the seed is the meaty, almond-shaped portion within. It is difficult sometimes to distinguish the seed from the dry fruit. The seed of the lettuce, the dandelion, and the little yellow seeds on strawberries are really dry fruits. The seed proper is within. The same may be said of grains of wheat and corn. The bran surrounds the real seed. In the case of acorns, walnuts, butternuts, and chestnuts, the true seed is surrounded by a shell. Beans, peas, turnip seeds, flaxseed, apple seeds, and the seeds of pears are true seeds. The cocoanut is one of the largest seeds known. Some seeds are so small it is impractical to count them without the aid of a microscope.

There are 100,000 known species of plants that produce seeds. Some plants produce a very few seeds. Others bear many thousands. A radish plant produces 12,000 seeds; the shepherd's purse, 64,000; the tobacco plant, 360,000. The size of a seed is no indication of the size of a plant it will produce. The hazelnut produces a shrub. The seed of the basswood produces

a forest tree. The seed of the cottonwood is smaller than that of the lettuce plant.

Nature has arranged for the distribution of seeds in many ways. Many seeds are wrapped in burs, or furnished with barbs, with which they adhere to the hair of animals and the clothing of man. Some plants, like the tumble-weed, break off near the ground and go racing across the country before the wind, scattering their seeds at every bound. The seeds of the dandelion, the thistle, the cottonwood tree, the cotton plant, the milkweed, the goldenrod, the aster, and many others are furnished with a tuft or clothed with fibers, enabling them to sail away in the wind. The seeds of the maple and the box-elder, the elm and the ash, are furnished with wings, which cause them to whirl and sail to quite a distance in falling. The cocoanut falls into the surf and dances along the coast, until it finds a suitable place to take root. The water hyacinth of the southern bayous has no root. It travels about with wind and wave and knows where to drop its seed. Some pods, like those of the snapdragon and touch-me-not, spring open with a snap, flinging the seeds to a considerable distance. Animals carry seeds. A migrating duck may carry seeds a thousand miles in mud on its feet.

Seeds play a large part in providing food for man, as well as for the animals on which he is dependent. They contain valuable oils and starch. Beans, peas, flour, meal, bread, breakfast foods, coffee, rice, pepper, and nuts are either seeds or seed products. Nine-tenths of the human race live chiefly on seeds.

Most seeds grow best soon after they are ripe. Some hard seeds, including many of the nuts, require the action of moisture and frost to crack the shells. Some seeds require to lie in the earth for several months or even two years before they are ready to grow. Others, with a proper degree of heat and moisture, send out a green shoot within forty-eight hours after they are planted.

The matter of seed is one of importance to every farmer. If wise, he chooses the largest and plumpest kernels of wheat, oats, rye, and barley. It is well, frequently, to obtain seed from a different sort of soil. The farmer having a heavy, cool soil prefers to obtain seed from a neighbor whose soil is sandy and warm. In a region having a short growing season, it is best to plant northern-grown seeds.

The business of raising and marketing flower and vegetable seeds has become an occupation by itself. It does not pay the florist or the gardener to raise his own seeds. In the United States the business has become centralized. It has been found, for instance, that beet seed can be imported from France more cheaply than it can be raised at home. Cauliflower seed is imported generally from Denmark and Italy. Celery seed, lima beans, onion seed, and lettuce are raised to advantage in California. Seed dealers depend largely on Nebraska for squash and cucumber seeds. Connecticut excels in the production of turnip, tomato, onion, and cabbage seed.

Congress allows seed to be sent through the mails at the low rate of one cent for each two ounces or fraction thereof. Flower seeds may be imported free. Garden seeds are subject to a tariff of thirty per cent of their value. American dealers export about $3,000,000 worth of seeds annually. San Francisco, Philadelphia, Rochester, Detroit, and New York may be named as centers of the seed trade. There are over 150 American firms engaged in distributing seeds. Seed firms purchase usually from growers. American seed growers receive about $4,000,000 a year. The largest item reported by growers is garden peas, $1,000,000. The wholesale value of flower seeds is about $150,000 a year. The retail value of bulk and packet seeds is, of course, many times the sum received by growers.

Seeds vary in size and weight. Some seeds, as a cocoanut, may weigh several pounds. The number of seeds per pound for a number of the familiar trees is:

Trees.	Seeds per pound.
Birch	400,000
White pine	30,000
Box elder	10,000
White ash	10,000
Basswood	8,000
Soft maple	4,000
Hickory	40
Black walnut	20

The amount of seed required for planting varies greatly. A tablespoonful of tobacco seed is sufficient to start plants enough for six acres. There are 1,300,000 timothy

1. The squirting cucumber. 2. Pod and ejected seed of oxalis. 3. A European touch-me-not. 4. Seed-flinging fruit of the mountain sage. 5. Seed-flinging fruit of the crane's-bill. 6. Winged fruit of the maple. 7. Fruit of the Oriental hornbeam. 8. Plumose fruit of the clematis. 9. Tufted seed of the dandelion. 10. Fruit of the Cretan plantain. 11. Nest clover. 12. Awned fruit of wheat grass. 13. Bur of a European composite. 14. Star clover. 15 and 16. Fruit of the fig-marigold. 17. Fruit of bur-parsley. 18. Barbed fruit of the Spanish needle. 19. Fruit of the caltrop. 20. Spiny fruit of the cocklebur. 21. Fruit of a geum. 22. Head of common burdock. 23. Bur-like fruit of the Linnaea borealis, or twin-flower.

DISPERSAL OF SEEDS.

seeds to the pound, and a pound of red top contains 6,000,000 seeds. A permanent meadow should receive from ten to twenty million seeds. Bailey recommends the following:

QUANTITY OF SEED TO THE ACRE.

Alfalfa	20 to 25 lbs.	Parsnips	4 to 8 lbs.
Barley	8 to 10 pks.	Popcorn	3 lbs.
Bean	2 to 6 pks.	Potato	6 to 14 bus.
Beet	4 to 6 lbs.	Red-top	12 to 15 lbs.
Blue grass.	25 lbs.	Rice	1 to 3 bus.
Broom corn	3 pks.	Rutabaga	3 to 5 lbs.
Buckwheat	3 to 5 pks.	Rye	3 to 8 pks.
Cabbage	¾ to 1 lb.	Sorghum	2 to 5 lbs.
Carrots	4 to 6 lbs.	Sugar beets	15 to 20 lbs.
Clover, red	16 lbs.	Sugar-cane	4 tons cane.
Clover, white	10 to 12 lbs.	Timothy and Clover: Clover	4 lbs.
Corn	6 qts. to 1 bu.	Timothy	10 lbs.
Cotton	1 to 3 bus.	Sweet potato	1½ to 4 bus.
Flax	2 to 3 pks.	Timothy	15 to 25 lbs.
Hemp	3½ to 4 pks.	Turnip	2 to 4 lbs.
Millet, German	1 pk.	Wheat	6 to 9 pks.
Oats	2 to 3 bus.		

See FLORICULTURE; VEGETABLES.

Seersucker. See GINGHAM.

Seine, sān, the chief river of France. It rises in the historic region of Burgundy and flows, in general, northwestward into the English channel at Havre. Its valley is a region rich in grain, orchards, and wine. The river was known to the Romans as the Sequana, the inhabitants as the Sequani. The Seine is connected by a network of canals with the Loire, the Saone, the Rhone, and the Rhine. Its total length is about 482 miles. It is navigable for sea vessels as far as Rouen, and for smaller vessels to Paris. Small boats may ascend still higher. Troyes, Fontainebleau, St. Denis, St. Cloud, Sevres, Versailles, St. Germain, Rouen, Havre, and other historic cities and towns situated on its banks are the subjects of separate articles. The lower valley of the Seine formed the large province of Normandy. Below Paris the Seine is noted for its beautiful scenery.

Seismograph, sīs′mō-graf, an instrument designed to record an earthquake shock. The simplest contrivance is a cup of molasses. The wave of molasses raised by the quake registers itself by a stain on the side of the cup. The scientific instrument, known also as seismometer (sīs), registers by means of three delicate pointers tracing lines on smoked glass. A tremor of the earth starts clockwork that sets the panes of glass in motion. One of these pointers points in a vertical direction, the others are horizontal. The direction, violence, and duration of the motion is indicated by lines traced on the glass. An ingenious contrivance causes a clock to stop at the beginning of the tremor, thus fixing the time of occurrence. The Japanese excel in the study of earthquakes by means of these instruments.

Seismometer sīs-mōm′e-tēr. See SEISMOGRAPH.

Selden, John (1584-1654), a learned English jurist, antiquary, and author. He was born at Salvington, Sussex, and died at London. He studied at Hart's Hall, Oxford, and was afterward called to the bar of the Inner Temple. He established a large practice, but made a greater reputation as a scholar and writer than as a lawyer. His first work of importance related to the civil government of Britain previous to the Norman conquest. Other works were *Titles of Honour, Concerning the Syrian Gods, History of Tithes,* and *Table Talk.* The last is his best known work.

Selene, sĕ-lē′nē, in Greek mythology, the goddess of the moon. She was the daughter of Hyperion and Thea. Selene was confounded to some extent with Artemis, and with Diana of the Romans. See DIANA.

Selenium, a non-metallic element discovered by the chemist Berzelius in 1818. In the series of elements, it falls between sulphur and tellurium. It is found free in small quantities in connection with sulphur, and in compounds with copper, lead, mercury, silver, etc. In one of its forms, selenium is a red powder which melts on the application of heat. On cooling, it solidifies into a dark glassy mass. Selenium possesses a peculiar property. Its resistance to the passage of an electric current diminishes as the intensity of the light to which it is exposed increases. The metal is of no great importance in the arts. In combination with hydrogen it forms a gas quite as disagreeable as the sulphuretted hydrogen of rotten eggs.

Seljuks, a Turkish dynasty named after Seljuk, a chief of the Ghuz Turks. It was founded by Togrul Beg, the grandson of

Seljuk, who conquered Persia in 1038 and assumed the title of sultan. Further conquests were made by his successors, and under Malek Shah the whole of Arabia, Palestine, Syria, Armenia, and parts of Asia Minor came into the possession of the Seljuks. When Malek Shah began to break up the kingdom and divide it among his four sons, the decline of this vast empire, stretching from the Chinese frontier to the Caspian Sea on the one side, and the Arabian on the other, set in. The Seljuks were gradually overcome by the Mongols. Finally the Ottoman princes gained the ascendency which they had been deprived of by the Mongols, and from the ruins of the empire controlled first by the Seljuks and then by the Mongols, grew the Ottoman Empire.

Selkirk, a county in the south of Scotland. It contains the vales of Ettrick and Yarrow, celebrated in song and romance. The name has been conferred on a lofty, snow-capped range of the Rocky Mountains in western Canada.

Selkirk, Alexander (1673-1723), a Scottish sailor. He gained some reputation as the commander of buccaneering ships. He was neither more nor less than a pirate engaged in preying on the ships of foreign nations. In 1704, owing to a dispute, he was put ashore at his own request on the island of Juan Fernandez and remained there alone for four years. He is popularly believed to be the original of Defoe's *Robinson Crusoe*. His *Life and Adventures* were published in 1820. He is the subject, also, of the poet Cowper's well known lines beginning:

> I am monarch of all I survey,
> My right there is none to dispute.

Selkirk's sea chest and cup are preserved in the Edinburgh Museum of Antiquities. In 1903 his old gun, a flint-lock fowling-piece, was placed in the British Museum. The stock bears his name carved in rude letters, and the date, 1701. See DEFOE.

Selkirk, Manitoba, twenty-two miles north of Winnipeg, is on the Red River at the head of Lake Winnipeg navigation and at the head of the tourist lake traffic covering Norway House and the great north country. It is the center of the lake fishing industry. It is served by an electric railway and by the Canadian Pacific Railroad. Hydro-electric power is available, and there are manufactories of finished lumber, insulation board, pulp and paper, beaverboard, ships, iron and steel, boxes and nuts and bolts. Selkirk has a well equipped general hospital, and is the site of one of the provincial mental hospitals.

Selkirk is well paved and electrically lighted, and has four schools, a library and seven churches. The city is growing steadily, and in 1921 had a population of 3,726.

Selkirk Mountains, a mountain range situated in British Columbia; they extend from the boundary of the United States to the Columbia River. The Mountains are famous the world over for their uncultivated beauty and terrific snow storms. Upon the slopes of the wide cliffs are tall trees. The mountains are estimated to be about 200 miles in length and ninety miles in width. One of the most famous of the glaciers is one called Illecillewaet, situated near the local station of the Canadian Pacific Railway. Enclosing the Selkirk Mountains are the Columbia and Kootenay rivers.

Years ago these mountains were believed to be a branch of the Rocky Mountains, but investigation proved that there is a long, narrow Rocky Mountain Trench which definitely separates the two ranges. Southeast of the Selkirk Mountains, however, there is a range called the Purcell Range, which may in times past have been connected with the Selkirks.

In 1857 many people were attracted to the region by the discovery of gold, which was later found to be fairly abundant and which was mined extensively. Since then many other minerals including zinc, mercury, silver, marble and copper were discovered. Gold mining operations are carried on in this territory on a large scale, and considerable success is attained by the prospectors. Deposits of the other minerals mentioned are also being exploited. The Selkirk region is often called "Swiss America."

Selma, Ala., the county seat of Dallas County, is on the Alabama River at the head of navigation, and on three railroads. It is about fifty miles directly west of

Montgomery. The agricultural and stock raising district in which it lies contributes to the city's wealth. Its manufactures include cotton-seed oil, engines, boilers, machinery, wagons, bricks, fertilizer and boxes. Repair shops of the Southern Railway are maintained here.

Selma has an excellent system of public schools, consisting of four elementary schools, one junior high school and one senior high school. There are also two private kindergartens, two private elementary schools and one private high school—Dinkins Training School—besides a parochial school operated by the Catholic Church. Public schools are provided for the Negroes. There are also three church and private schools for the Negro—Knox Academy, Payne University and Selma University. The city has a Carnegie library.

During the Civil War, Selma was an important Confederate military base. On April 2, 1865, the place was taken by a Federal army under General Wilson. In 1920 the population was 15,607.

Selva, a Spanish word meaning forest. The most noted are the selvas of the Amazon, which rival the forests of the Congo. See AMAZON.

Semaphore, a device for signaling by means of flags, lanterns, or upright posts with movable arms. Different combinations of the flags and lanterns or movements of the signal-arms serve to indicate the different letters of the alphabet. Since the invention of the telegraph its use is not so important in the army and navy, except in war-signaling when special codes are employed. A very simple form is in use by railroads, consisting of an upright standard to which are attached one or more boards called arms. These arms when raised or lowered indicate the necessary signals, colored lights being used on them at night.

Sembrich, Marcella (1858-), an operatic singer, was born in Lemberg, Austria. She first studied piano and violin, later taking up the study of singing in Milan, Italy, for three years under Lamperti. Her first public appearance was at Athens in *I Puritani,* where her lovely voice attracted favorable attention. She later appeared in the large cities of Europe, everywhere being acclaimed as a great operatic star. She came to the United States in 1883, and sang for many years with the Grau Opera Company. She also gained distinction in her rendering of German grand opera rôles. During recent years Mme. Sembrich has made Dresden her home, occasionally appearing in recitals. Her voice has been remarkable for its purity of tone, wide range and variety of shading.

Seminoles, a tribe of American Indians related to the Creeks, Chickasaws, and Choctaws. They took possession of the peninsula of Florida about the time of the American Revolution. The name is Creek, signifying renegades or separatists, in allusion to their seceding from the parent Creek stock. They are known in American history chiefly by reason of the Seminole War, one of the longest, bloodiest, most fiercely contested, and expensive Indian wars on record. It was brought about in the usual way. The whites encroached on the red men, scaring away their game and driving them farther back into the forests. A preliminary contest broke out in 1817-18. The settlers overwhelmed Congress and the president with complaints of petty depredations and accounts of the risk they ran of massacre. In 1834 the representatives of the government succeeded in exacting a treaty by which the Seminole chiefs yielded their country and agreed to migrate to a new home beyond the Mississippi.

When the actual work of removal was attempted, trouble began. The Seminoles were led by a skillful chief named Osceola. The United States troops were commanded by General Wiley Thompson. When summoned to a conference, Osceola bore himself haughtily. Thompson ordered him put in irons for a day. This affront the offended savage never forgave. He bowed his head in apparent acquiescence. He agreed to bring in all the horses and cattle belonging to his people to be exchanged for others to be delivered in their new home. Thompson, evidently a man who had little knowledge of Indian nature, even advertised the stock for sale. In the meantime, runners and messengers in swift canoes

summoned the warriors to council. On the date when the stock was to be brought in, scalping parties fell on the settlements bordering the everglades, burned cabins, murdered the inhabitants, and drove off cattle into the swamps. Young Major Dade, hastening from Tampa Bay with 100 men for the relief of the settlers, was cut off at Wahoo Swamp, only four men escaping. On the same day, and only a few hours before, Osceola and a band of his warriors surprised General Thompson and five brother officers who were dining at a store near Fort King. Osceola had the savage satisfaction of killing and scalping the general with his own hand. The band escaped into the woods before the attack was known at the fort. For seven years this able chieftain baffled the troops of the United States, though led by such commanders as General Scott and Zachary Taylor. There were forced marches into the swamps, surprises, attacks, and counter attacks. The Indians would disappear only to reappear elsewhere with brand, rifle, and tomahawk. Finally the spirit of the Indians was broken. October 21, 1837, Osceola appeared at the Camp of Colonel Jesup with several chiefs and seventy warriors to consider terms of peace. Though protected by a flag of truce, Osceola and his companions were seized and imprisoned at Fort Moultrie, where the indomitable chief died of a fever.

The Seminoles had lost their leader. They protracted the war bravely, but in vain. In 1842, 3,824 men, women, and children turned their backs on their once happy hunting grounds and migrated to Indian Territory. Their descendants to the number of 2,757 still form one of the so-called five civilized tribes. About four hundred Seminoles, descendants of Indians who secreted themselves from the troops, still live in the Everglades of Florida. They are a harmless, inoffensive people, subsisting by hunting and fishing, raising patches of corn, by selling berries and fish, and by guiding parties of hunters or fishermen.

See CREEKS; CHOCTAWS; INDIAN TERRITORY; OSCEOLA.

Semiramis, se-mĭr′a-mis, an Assyrian princess. The Syrian form of the name means "loving doves." In history, Semiramis was the wife of Ninus, the founder of Nineveh. According to an Assyrian myth, she was the daughter of an Assyrian goddess and possessed surpassing wisdom and beauty. Tradition, the source of information of the Greek historians, credited her with the government of Assyria after her husband's death and with the completion of the walls of Babylon, hanging gardens, the temple of Bel, and the bridge over the Euphrates. She is said also to have led the armies of Assyria in Egypt, Ethiopia, Libya, and India. Although her portrait appears on Assyrian monuments, being, in fact, the only female face seen there, the cuneiform inscriptions say nothing of the deeds popularly ascribed to her. She lived possibly about 800 B. C. Margaret, the warlike queen of Norway, Denmark, and Sweden from 1353-1412, has been called the Semiramis of the North. The name was coveted also by Catherine II of Russia. See BABYLON.

Semites, sĕm′ĭtz, a subdivision of the white race. The name is derived from their reputed ancestor Shem, the son of Noah. The chief representatives are the Arabs, Hebrews, Abyssinians, Assyrians, and Chaldeans. The Semites have glossy black curly hair and heavy beards. The skull is long; the complexion is dark and tans without reddening. The nose is prominent; the lips are prominent and are usually red; the eyes are dark. The arts, sciences, and literature were developed by the Semitic people at an early date, and the great monotheistic religions have originated with them. See ARABS; JEWS, etc.

Semitic Languages. See LANGUAGE, SEMITIC.

Semmes, Raphael (1809-1877), a Confederate naval commander. He was a native of Maryland. He entered the United States navy as a midshipman in 1826. He served with ability during the Mexican War from 1859 to 1861. He was an efficient member of the lighthouse board charged with the construction of lighthouses and signal stations along the Atlantic and Gulf coasts. At the outbreak of the Civil War he resigned his commission and was given the command of the Sumter, the first privateer fitted out by the Confederacy.

He captured many American merchantmen. He is charged with the deception of displaying the British flag in order to approach his victims without awakening their suspicion. Later he was placed in command of the Alabama. At the conclusion of the war, he practiced law in Mobile, Alabama, for a time. See ALABAMA CLAIMS.

Senate. See CONGRESS.

Seneca (4 B. C.-65 A. D.), a Roman philosopher. He was a member of the Roman Senate and an accomplished courtier. He taught Nero when a youth and had great influence over him when emperor. He accumulated a fortune of $15,000,000. Falling into disfavor, he was commanded to commit suicide, and did so. His writings are bulky. They have little interest as literature, but are of great value as a picture of the social ideas of his day. Seneca was an upholder of the stoic philosophy. A few quotations are given here:

Not lost, but gone before.

No great genius without a tincture of madness.

Fire is the test of gold; adversity of strong men.

I do not distinguish by the eye, but by the mind, which is the proper judge of the man.

Senegambia, a region of western Africa. It extends from the Atlantic to the upper valley of the Niger. The name is a compound of Senegal and Gambia, the chief rivers. The region is one of abundant rainfall and equatorial vegetation, of gigantic trees and massive forests, resembling in these respects the valley of the Amazon. The baobab, cocoa-palm, pomegranate, and sycamore abound. In the more open parts of the country there are herds of antelopes, gazelles, and giraffes. The rivers swarm with crocodiles. The hippopotamus is seen occasionally. There are still a few elephants. On the border next the Sahara the ostrich, the rock partridge, and the quail are seen. The bulk of the population is negro. This region was formerly drawn upon heavily by the slave traders, hence the expression "woolly Senegambian." The coast has been partitioned by France, England, and other countries. See AFRICA; CONGO; NIGER.

Senna, a drug consisting of the dried leaflets of several kinds of cassia. One species, a pea-like herb, with yellow flowers and sensitive leaflets, grows wild in the United States. It is known to botanists under the name of *cassia marilandica*. The common name is partridge pea. American children touch the leaflets to see them close up like a sensitive plant. The drug, senna, is obtained, however, chiefly from an African species. It is exported from Alexandria. This is the leaf used to make senna tea, taken for medicinal purposes. See SENSITIVE PLANT.

Sennacherib, sĕn-năk′e-rĭb, a king of Assyria (705-681 B. C.). He was the son and successor of Sargon, the same who planted the Babylonian colony in Samaria. He was a great builder and conqueror. He contended with Egypt for the supremacy of the countries bordering the eastern Mediterranean. Sennacherib made Nineveh his capital. Our principal sources of information are the Greek historians and the cuneiform inscriptions found in Mesopotamia. Palestine and Phoenicia, having formed a league with Egypt, provoked a descent of an army led by the great Assyrian, resulting in the disastrous defeat of the latter. According to the Egyptian account as related by the Greek historian, Herodotus, Sennacherib's defeat was incurred by an invasion of field mice that devoured the quivers and bowstrings of his archers and ate the thongs with which they bound their shields. The cuneiform inscriptions of Assyria make no mention of defeat. According to the Hebrew account, a pestilence fell on the conqueror's forces and 180,000 troops perished in a single night. This is the version referred to in Byron's familiar lines:

The Assyrian came down like the wolf on the fold,
And his cohorts were gleaming in purple and gold.

See SAMARIA; NINEVEH.

Senses, ordinarily speaking, the five modes by which outside impressions or information reach the brain. See EYE; EAR; TONGUE; BRAIN, etc.

The famous town of Mansoul had five gates in at which to come, out at which to go, and these were made likewise answerable to the walls, to wit, impregnable, and such as could never be opened nor forced but by the will and leave of those within. The names of the gates were these, —Ear-gate, Eye-gate, Mouth-gate, Nose-gate, and Feel-gate.—John Bunyan.

Sensitive Plant, an herb belonging to the pea family. It is an erect, hairy plant, a native of Brazil. The leaves are long, petioled, and have numerous pairs of leaflets arranged pinnately. Purplish flowers are clustered in heads. The fruit is a spiny, pointed pod. The plant has a peculiar property of being sensitive to the touch. At the slightest touch the leaflets droop, closing together in pairs. At a second or more decided touch, the petiole bends downward, depressing the leaf toward the stalk. If left undisturbed, the petiole rises and the leaflets spread again. A blow on one leaf may cause several leaves to droop and close. The plant is tropical. It is cultivated in conservatories, and as a house plant for amusement, rather than for ornamental purposes. The partridge pea and other related plants native to the United States are sensitive likewise to a considerable degree. See SENNA.

Seoul, sĕ-o͞ol′, the capital city of Korea. Population, about 150,000. There are three Korean dailies. The officials are Japanese. There are enough British and American residents to support an English school and an English daily paper. The chief exports are rice, beans, cotton, ginseng, cow hides, and gold. See KOREA.

Separator, in dairying, a machine for separating the milk from the cream. The Babcock separator is constructed on the principle of centrifugal force. The milk enters a revolving drum. The skimmed milk, being heavier than the cream, is thrown outward by the whirling drum and escapes by a set of tubes. The cream, being lighter, remains nearer the center and escapes by a second set of tubes. To obtain the best results, the milk should be at the point of animal heat, and the machine should be operated steadily without jarring or shaking. Under the ordinary method of setting milk in pans, cans, and crocks, it is considered that from an eighth to a fourth of the cream fails to rise. Practically no butter-fat remains in the skimmed milk of the separator.

Sepia. See CUTTLEFISH.

Sepoy, a native Hindu enrolled in the British East Indian army. Owing to the effect of a torrid climate on European troops, the Indian government has found it advisable, from the date of first occupation, to employ natives as soldiers. The Sepoy is more active, temperate, and enduring than the British soldier, but is not his equal in battle. About 150,000 Sepoys wear the British uniform. In 1857-8 the Sepoys, enraged to find that a new cartridge required the touching of grease—an act abhorrent to their Mohammedan faith—rose in the "Sepoy Mutiny." See HAVELOCK; LUCKNOW.

September, the seventh month of the old Roman year, the ninth month of the revised calendar. "Thirty days hath September." The Romans celebrated feasts in honor of Juno, Jupiter, and Minerva in September. Charlemagne called it the "Harvest Month." The first Monday in September is observed as "Labor Day."

Septuagint, sĕp′tu-a-jĭnt, a name applied to a Greek translation of the Old Testament, from a Latin word meaning seventy. According to tradition, about 270-280 B. C., Ptolemy II (Philadelphus), a Greek king of Egypt, sent a letter to the Jewish high priest at Jerusalem requesting that six men from each tribe be sent to Alexandria to provide the library with a Greek translation of the Old Testament. This the high priest did. The delegation of seventy, or, to be exact, seventy-two, learned men repaired to Alexandria and completed their work in seventy-two days. This translation, so the legend states, was accepted both at Jerusalem and at Alexandria as the official text. As a matter of fact, the Greek version of the Old Testament was the work of many hands, extending through many years. By whomsoever the work was done, it must have been done well, however, for the differences between the Greek and Hebrew versions of the Old Testament Scriptures are very slight indeed. See BIBLE.

Sequin, a gold coin of Venice. It was first issued about 1280 and was minted by successive doges during the continuance of the republic. The intrinsic value was about $2.18. The reverse side bore a figure of Christ; the obverse represented St. Mark blessing the banner of Venice held by a kneeling doge. During the great days of Venice the sequin was the world coin of commerce.

Sequoia, sē-kwoi′a, a coniferous tree of California. A gigantic forest tree, possibly the largest in the world. There are two kinds of sequoia. The first, the California redwood, occupies a long, broken strip on the ocean side of the Coast Range. It is limited strictly by the reach of Pacific fogs. It grows to a height of 200 to 400 feet. It is an exceedingly valuable tree. It has supplied California with lumber for several decades. Redwood has been brought eastward for interior finish which reminds one of beautiful cedar or cherry woodwork. When we pause to think of two-hundred-foot trees standing close together with trunks 75 to 100 feet clear of limbs, we realize that such a grove cut into lumber could not be piled on the ground where it grew. No other such lumber-producing forests have been seen before or ever will be seen again. Many redwood trees over 20 feet in diameter and 300 feet in height are still standing.

The other sequoia is the California Big Tree, although it is asserted, that, in reality, the redwood is the larger tree. Big trees are found farther from the ocean, but only in a few scattered groves in a belt running north and south for 200 miles along the western slope of the Sierra Nevadas. The general government set aside the Sequoia and the General Grant groves as national parks. The famous Calaveras groves were owned by a lumberman, but, as a result of agitation, the government in 1909 exchanged other timber lands for these groves and added them to the National Forest Reserve. Over 4,000 acres of land and 1,500 giant trees were included in the reservation. A big tree under six feet in diameter is not counted, being a mere sapling. The "Father of the Forest," now down, is estimated to have had a height of 450 feet, and a diameter at the ground of more than forty feet when standing.

Big trees reproduce themselves with difficulty. The seed does not grow very well and the stumps do not sprout. There are few young trees. Asa Gray estimated the age of one twenty-four foot tree at 1,600 years. Muir estimated the age of some living trees at 5,000 years, and the stumps of trees felled seem, from a count of the rings of annual growth, to bear out a claim of 4,000 years. At all events these trees contest with Old World cypresses and the Australian eucalyptus for the honor of being the oldest living things on the face of the globe. There is a real danger that they may be exterminated.

The name sequoia was given in honor of an Indian chieftain, — the same who invented the Cherokee alphabet.

See YOSEMITE; CALIFORNIA; MUIR.

Seraglio, sē-răl′yō, formerly the official palace of the sultan at Constantinople. The word is Italian, meaning inclosure. The sultan's seraglio inclosed a number of government buildings and a mosque, as well as his private home or harem in which his many wives lived. Entrance to the seraglio is gained by means of a lofty gate known as the Sublime Porte, a name applied often to the sultan himself. See CONSTANTINOPLE; TURKEY.

Serapis, the Roman name of a deity of Egyptian origin. The Greeks identified Serapis with their own Hades as god of the lower world. When the Greeks conquered Egypt they were led by political reasons to build a magnificent temple of Serapis, called from his name the Serapeum, at Alexandria, and united with the Egyptians in his worship. The following account of the Alexandrian temple and the worship of Serapis is taken from Milman's *History of Christianity:*

> The Serapion, at that time, appeared secure in the superstition which conected this inviolable sanctuary, and the honor of its god, with the rise and fall of the Nile, with the fertility and existence of Egypt, and, as Egypt was the granary of the East, the existence of Constantinople. The Pagans had little apprehension that the Serapion itself, before many years, would be leveled to the ground. The temple of Serapis, next to that of Jupiter in the Capitol, was the proudest monument of Pagan religious architecture. Like the more celebrated structures of the East, and that of Jerusalem in its glory, it comprehended within its precincts a vast mass of buildings, of which the temple itself formed the center. It was built on an artificial hill, in the old quarter of the city, called Rhacotis, to which the ascent was by a hundred steps. All the substructure was vaulted over; and in these dark chambers, which communicated with each other, were supposed to be carried on the most fearful and, to the Christian, abominable mysteries. All around the spacious level platform were the habitations of the priests, and of the ascetics dedicated to the worship of the god.

Serf, one held in a modified form of slavery, bound to the soil, without rights as against his master, who could not sell him, however, like a slave.

Serfdom originated in the slavery of ancient republics and was transformed by the influences of Christianity and Feudalism. The slavery of the Germanic tribes was transformed into serfdom after the conquest by the Romans. Many, on account of famines and the need of protection were led to sell themselves to the powerful, especially to churches and monasteries. As a general thing the position of the serf was far superior to that of the slave under Roman rule.

In England before the Norman conquest a large part of the people was in serfdom. After the conquest the condition of the serf was much improved, but he could not own property and was sold with the land. The abolition of serfdom in Europe was gradual, extending from 1574 in England to 1861 in Russia.

See FEUDALISM; RUSSIA.

Serge, a worsted fabric of twill weave made in a variety of weights and degrees of fineness. Serge is used for both men's and women's suits. It is light, durable, sheds dust, and is cleansed readily. It is usually wiry, but certain fine varieties are soft and pliable. Serge has been in use since the twelfth century and is still one of the most popular of standard fabrics.

Serpent. See SNAKES.

Serum Therapy, a mode of treatment of certain diseases by injection of modified blood serum of man or some other animal. There are, it may be said, two purposes and, hence, two branches of the subject. The first purpose is to render the person immune, that is to say, proof against attack; the second is to destroy the bacterium or other organism and counteract the toxin, the poison, produced by it. Dr. Jenner's vaccination against smallpox and Pasteur's treatment of rabies may be cited as examples of treatment designed to produce immunity. It is believed that progress has been made in preventing anthrax, cholera, plague, typhoid, and tuberculosis. In the second branch of serum therapy the design is to cure a disease already well seated. The most positive results have been secured in the treatment of diphtheria. Physicians now rely almost wholly on the injection of anti-toxin. This anti-toxin is developed in the body of a horse, that is to say, the serum of a horse inoculated by a physician is injected in the circulatory system of the patient where it sets up an action that counteracts the toxin or poison of the diphtheritic bacteria that swarm in the blood of the patient. Students of serum therapy claim that progress has been made in the cure of lockjaw, dysentery, pneumonia, and blood-poisoning. See VACCINATION; CHOLERA; TYPHOID; DIPHTHERIA.

Servetus, ser-vee'tus, **Michael** (1511-1553), a Spanish physician and controversialist. He was born at Tudela, Spain. His father was a well-to-do notary. Servetus, a Latinized form of the family name, Serveto, studied law at Saragossa and Toulouse, but he appears to have taken more interest in theology. At Toulouse he saw a copy of the Bible for the first time. It was his fortune to travel in the train of a great man. He visited Bologna and Augsburg in the party of Juan de Quintana, the confessor of Charles V. As early as 1531, when only twenty, Servetus published a Latin pamphlet, *Errors of the Trinity,* in which he attacked the trinitarian doctrine. The pamphlet attracted attention, and a year later a revised second edition was published. Melanchthon wrote, "I read Servetus diligently."

We next hear of Servetus, 1535, editing scientific works for a printing firm in Lyons, France. A physician, whose friendship he won here, inspired Servetus to set off for Paris, 1536, to study medicine. He made a reputation for skill in dissection and was ranked "second to scarce any in knowledge of Galen." Calvin, in Paris, on a hasty errand, took occasion to set so bright a young man right on the question of the Trinity and appears to have lost his temper. Servetus wrote a popular treatise on sirups, lectured on geometry, and was defendant in a suit brought against him by the medical faculty on the ground of having delivered objectionable lectures on astrology. Servetus appears to have had a penetrating, inquiring, restless, brilliant mind. The

rapidity with which he shifted, 1538, studying theology and Hebrew at Louvain, 1539, the practice of medicine at Avignon, 1540, a student of medicine again at Montpelier, and 1541 assisting the publishers again in Lyons, indicates as much. In the year last named, he entered the service of the distinguished archbishop of Vienne, who had heard him lecture in Paris. Vienne and its cathedral are situated on the banks of the Rhone, fourteen miles south of Lyons, about 100 miles from Geneva, where Calvin lived. Servetus remained in the household of the archbishop as confidential physician for twelve years.

Outwardly, Servetus had been a Catholic all these years, and there is no reason to believe that he withdrew from the church; but, although he appears to have been a sincere friend, he gave the good archbishop no little trouble by heretical utterances. He studied and wrote in private and opened correspondence with Calvin, and in 1546 he sent Calvin the manuscript of a revised edition of his tracts which he had in mind to publish. He proposed, also, that he visit Calvin. The latter replied in an inhospitable tone, and on the same day wrote a friend, "If Servetus shall come, I shall never suffer him, provided my influence prevail, to depart alive." It is needless to add that Servetus did not get his manuscript again. Although he knew he was getting on dangerous ground, he recast his pamphlets and, not being able to get the volume printed by a publisher at Basel, he had a thousand copies printed in secret under the very shadow of the cathedral of his staunch protector, the archbishop. The edition was completed January 3, 1553. The copies were sent privately to Lyons and to Frankfurt for sale the following Easter. Before that day, a letter arrived in Lyons from Geneva, revealing the secret of the forthcoming volume and its authorship. The inquisitor general was set on the track, the edition was seized, and Servetus was interrogated, arrested, and thrown into prison. The Geneva letter is believed to have been dictated, not by Calvin, but by a person having a grudge against the Lyons bookseller, but Calvin, now that the matter was up, furnished proof that Servetus was the author. April 7th, Servetus, due in all probability to be burned, escaped from prison through the connivance, it is believed, of the compassionate archbishop. After four months of wandering, Servetus was recognized one day in a Protestant congregation at Geneva. The Presbyterians, who hated a Unitarian even worse than they did Catholicism, arrested Servetus and spent two weeks in trying him for heresy. He was convicted of fifteen errors. Calvin counseled a moderate sentence and wanted Servetus beheaded, but the authorities burned both Servetus and his works at the stake. The volumes in question were hunted down and destroyed by Calvinist and Catholic. Only two copies are known. Curiously enough, in one passage Servetus describes the circulation of the blood. Had not the volumes been destroyed, the medical world would have had the true theory of circulation half a century before it was discovered independently by Harvey, the English physician. In 1903 Calvinists the world over subscribed toward the erection of an "expiatory" statue of Servetus at Geneva.

Servia, a kingdom of Europe situated on the right bank of the Danube which now forms a part of the kingdom of Jugoslavia. In point of altitude, surface features, and productions, Servia is comparable to Vermont and New Hampshire, but its area is as great, and its population is over three times as great, as that of the two states combined. The people live in small villages and walk out to till their fields or guard their stock. Grain and fruit are raised as in New England. Maize or Indian corn is the largest crop. It is fed to hogs or ground into meal, American fashion. Wheat is the second crop in value and, strange to say, prune plums are the third. Tobacco, silk, and wine are produced. Herds of swine run free in the mountains and feed on acorns. Gold, copper, lead, zinc, antimony, and silver are mined in small quantities. Large shipments of lumber and cask staves are made. World-famous rugs, unique for design, fast vegetable coloring, and substantiality, are woven by the women. The people are mostly Slavonians, and are adherents of the Greek Church. There are a few thousand Moslems, Roman Catholics, Protes-

tants, Jews, and Gypsies. The roads are rough and crude. Communication in the rural districts is difficult. The homes of the peasants are primitive. Only fourteen per cent of the population can read and write, but a system of public schools, including high schools, normal schools, and a university with 127 professors and 7,668 students, is maintained at public expense and is modeled on German lines.

In October, 1912, Servia joined Greece and Bulgaria in a war against Turkey and met with such success that by May, 1913, Turkey was pactically driven from the European continent. The allies could not agree in the division of the conquered territory so in July, 1913, a second war broke out with Bulgaria opposing the other allies and Turkey. This war lasted only a few weeks and resulted in Servia getting a part of Macedonia, thus bringing her frontier to the Greek border. Scarcely a year later the tragedy occurred which eventually led to the Great War. Austria-Hungary and Servia were enemies because the former possessed Bosnia and Herzegovina, which the latter claimed should belong to Servia, the people being of the Slavic race. Therefore, when Archduke Francis Ferdinand, heir to the throne of Austria-Hungary, and his wife were assassinated in Bosnia, the Austro-Hungarian government claimed that Servia was responsible for the agitation which led to the deed, and that some Servian officials had guilty knowledge of the conspiracy. Whether that is true or not, it appeared quite certain that the weapon came from the Servian government arsenal at Belgrade, and that at least one Servian officer was implicated. Nevertheless, Servia disclaimed responsibility, and Austria declared war.

Early in 1915, Austrian, German, and Bulgarian forces invaded the country and completely overwhelmed the Servians. From that time until the downfall of the Central Powers, Servia ceased to exist as a state, but after the signing of the armistice the government began to refunctionate and became a leading factor in forming the unified Jugo-Slav state. See JUGOSLAVIA.

Service, Robert William (1876-), a Canadian poet and novelist, was born at Preston, England, and educated at Glasgow, Scotland. After working in various clerical capacities in the British Isles, Service removed to Canada in 1897. He engaged in farming on Vancouver Island, but at the same time traveled much on the Pacific Coast and in the Yukon.

Mr. Service's first book of poems, *The Spell of the Yukon,* peopled with the miner, hunter, gambler, trapper—the elemental people of the north country—set the standard of all his later work and at the same time won him international applause. It was followed by *Songs of a Sourdough, Rhymes of a Rolling Stone* and *Ballads of a Cheechako,* verse; and the novels, *The Trail of '98* and *The Pretender.* On his experiences in the World War, Mr. Service wrote *Rhymes of a Red Cross Man.*

Set, or **Seth,** in Egyptian mythology, the god of evil and so the bitter enemy of Osiris. He was originally a warlike god and looked upon as either the brother or son of Osiris, whom he opposes in every possible way, although he was at times friendly to mankind.

Seton, Ernest Thompson (1860-), an author and artist. He was born in England; he studied at the Royal Academy, London; he spent three years in zoölogical study in Manitoba, and later studied in Paris under French artists. His works have been published in the United States, so that he is rather cosmopolitan. He is known for his numerous drawings of animals and birds, and for his paintings of wolves. His writings on animal subjects have been popular, and display marked literary merit. They have been criticized for inaccuracy in matters of natural history. The author himself states that his aim has been to "emphasize our kinship with the animals by showing that in them we can find the virtues most admired in man." He also states that his accounts of animals are true, "The chief liberty taken is in ascribing to one animal the adventures of many." *Wild Animals I Have Known, The Trail of the Sandhill Stag, The Biography of a Grizzly, Lives of the Hunted,* are among Seton's books, and well repay the reading. Seton is one of the writers whom Roosevelt and Burroughs characterize as "nature-fakirs."

Setter, a dog of the spaniel family. It gets its name from a habit of crouching

when it scents its quarry. Darwin thinks this habit merely the exaggerated pause of an animal about to spring upon its prey. While the natural thing for a setter to do is to set or crouch, the dog has been trained to stand rigidly erect like a pointer when it has found game. It is much used as a bird dog in this country. The common setter is a large, handsome, active dog, speedy rather than courageous. Its color is generally white, with large, liver-colored spots. The Irish setter, similar in form and habits, is of a solid, dark, mahogany-red color. The Gordon setter is black with red or tan marks on each side of the muzzle, on the hind legs below the hocks, and on the fore legs below the knees. English setters are divided into two classes, the Lewellyns, and the Laveracks. The former are black, white, and tan in color, the latter black and white. See DOG.

Seven against Thebes, Expedition of the, in Grecian legend an expedition of seven heroes against Thebes. When Oedipus was driven forth from his kingdom of Thebes, his two sons, Eteocles and Polynices, agreed to share the kingdom and reign alternately year by year. Eteocles had the first turn, and was so delighted with his power that, when the year was up, he refused to surrender the kingdom to his brother. Polynices fled to King Adrastus of Argos for help. Adrastus raised an army to help Polynices, and asked Amphiaraus, his brother-in-law, to join them. Amphiaraus was a soothsayer and, foreseeing disaster and his own death, advised against the expedition. But when Amphiaraus married Adrastus' sister, Eriphyle, he had agreed that any dispute arising between himself and Adrastus should be settled by Eriphyle. Polynices knew this, and bought Eriphyle's favor with the necklace and peplus of Harmonia, which fortunately he had brought with him from Thebes. Eriphyle insisted on the expedition, therefore, and Amphiaraus was obliged to consent. The others who made up the "Seven" were Tydeus, Hippomedon, Capaneus, and Parthenopaeus, king of Arcadia. All met death except Adrastus. This expedition was a favorite subject for the epic and tragic poets of Greece. Ten years later the Epigoni (or descendants), the seven sons of these seven chiefs, undertook a second expedition against Thebes, which was successful. They thus avenged the death of their fathers. See OEDIPUS.

Seven Sleepers, a legend originating in the early days of Christianity. According to tradition, seven noble Christian youths of Ephesus fled to a cave to escape persecution. The emperor, thinking to secure their death, sealed up the mouth of the cave. The young men fell immediately into a deep slumber. Two centuries later they were awakened accidentally by a countryman who opened the cave to make shelter for his cattle. Like Rip Van Winkle, they had no idea of the passage of time. Being pressed with hunger, they sent one of their number to the city to purchase bread. He was astonished to find the cross, the symbol of Christianity, in evidence everywhere. His ancient and decayed dress, strange language, and the antiquity of the coins offered in payment for bread attracted the attention of the baker. The latter ran to the magistrate with his story. The young man was carried before a judge, to whom he told the strange history of his life. The city magistrate, the bishop of Ephesus, and the emperor himself repaired to the cave where they found the other sleepers still bearing the bloom of youth. The young men related their experience, blessed the multitude, and expired.

Seven Weeks' War. See PRUSSIA.

Seven Wise Masters, The, a collection of tales of oriental origin. The plot of the story which holds these tales together is found in Buddhist literature stated as an actual occurrence. A certain prince had seven instructors by whom he had been taught in all branches of knowledge. The youth, by a study of the stars, learned that his life was in danger and could be saved only if he refrained from speech for seven days. On the first day, his stepmother denounced him to the king, supporting her statements with evidence and urging the king to put his son to death. The king is about to do so when one of the wise masters tells a tale which counteracts the stepmother's influence. This is repeated on each of the seven days, the stepmother having each time new evidences of the Prince's guilt and one of the wise masters refuting

it by a tale which affects the king's judgment and also makes him see the evils of a too hasty punishment. At the end of the seventh day, the prince can speak and is able to clear himself completely. The collection brought into western Europe by the Crusades has undergone many changes. It is of considerable importance in the history of well known fictions.

Seven Wise Men, The, seven men of ancient Greece famous for practical wisdom. They flourished in the sixth century B. C. The list, as commonly made up, consisted of Thales, Solon, Bion, Chilon, Cleobulus, Periander, and Pittacus. Referred to also as the Seven Sages of Greece.

Seven Wonders of the World, a term applied by the Greeks in the time of Alexander to the pyramids of Egypt, the hanging gardens of Babylon, the temple of Diana at Ephesus, the statue of Jupiter at Athens, the Mausoleum at Halicarnassus, the Colossus of Rhodes, and the Pharos of Alexandria. For further information, see separate articles.

Seven Years' War. In European history, a general struggle lasting from 1756 to 1763. Maria Theresa, desiring to recover Silesia from Frederick the Great of Prussia, formed an alliance of Austria, Russia, France, and most of the German states. Frederick was supported by England and four of his small German neighbors. Elizabeth, empress of Russia, died. Her successor, Peter III, was an admirer of Frederick. He withdrew from the alliance of the Austrian empress and joined Prussia. Frederick not only retained his holdings, but enlarged his territory. The war extended to the New World, where it was known as the French and Indian War. In America it was a struggle between the French and English for colonial supremacy. The war was decided on the Plains of Abraham. France lost Canada. The American colonies spent $20,000,000 in the conquest. The British government refunded $5,500,000, and voted another million dollars, but a part was withheld on account of American misconduct, the same that ripened into the War of the American Revolution. See MARIA THERESA; FREDERICK II; WOLFE; QUEBEC; PARIS, TREATY OF.

Severn, a river of England. It ranks second to the Thames in length and importance. It rises in Wales and empties into the Bristol Channel. Worcester and Gloucester are on its banks. See AVON; BRISTOL.

Seville, se-vĭl′, a city of Spain. It stands at the head of navigation on the Guadalquiver River. It lies in the fertile province of Seville, a region abounding in wine, oranges, and olives. The mountains near by yield an abundant supply of silver, lead, iron, coal, rock salt, chalk, and marble. The city was an ancient Roman colony. It was the western seat of empire of the Vandals and was an important city of the Goths. In 712 it passed under the control of the Arabs, who fortified the town strongly and adorned it with many magnificent buildings. In 1248 it was retaken by the Christians and 300,000 Moorish inhabitants went into exile. After the discovery of America, Seville was the first Spanish seat of commerce with the New World. It is still the most important commercial city of Spain. It is also an important manufacturing center of tobacco, leather, paper, spirits, chocolate, silk and woolen goods, soap, glass, and earthenware. The population in 1918 was returned at 150,631.

Although in a state of more or less decay, Seville is still the most interesting city architecturally in Spain,—one of the most interesting cities in Europe. The Gothic cathedral is nearly as large as that of St. Peter's at Rome. The exterior is homely, but the interior is beautiful. Clustered columns, stained glass, Gothic wood carvings, silver statues, the archbishop's throne, a huge chandelier, and choir stalls make a deep impression. There are good pictures by Murillo and other celebrated painters. The organ is one of the largest and finest in the world. It contains 5,300 pipes. The bell tower, 275 feet in height, is ascended by a series of inclined planes. It is of Moorish origin, and it is considered one of the finest specimens of the kind in Europe. The Alcázar, an old Moorish palace, rivals the Alhambra in delicacy and magnificence. There are many other Moorish palaces. One is mentioned by travelers as having eleven courtyards and nine fountains. The University of Seville, founded in 1502, oc-

cupies buildings originally built for a convent. The city exchange contains a mass of documents, known as the Archives, pertaining to colonial days. Only a small portion of them have been read as yet by modern scholars. A public bull rink seats 18,000 spectators. In size it ranks second in Spain. See SPAIN.

Sevres, sā′vr, a celebrated kind of French porcelain. Its manufacture was begun at Vincennes in 1745. In 1756 it was transferred to the village of Sevres, midway between Paris and Versailles. In 1760 the manufactory was purchased by Louis XIII. It has been in the hands of the French government ever since. The present factory employs about 200 persons. Sevres is made of kaolin. The richest pieces are decorated with small bubbles of colored enamel, imitating rubies, emeralds, etc. The ware has the faculty of absorbing decorative colors, giving them a peculiar richness and softness much admired. The finest collection of this ware is to be seen in the museum of Sevres itself. See PORCELAIN; MEISSEN; CHINA CLAY; POTTERY.

Sewage, a subject of great importance late years as shown in the attention given it by engineers, by public and private corporations, and by private persons. It is recognized that to protect the health of individuals and of the community, all impure matter must be promptly removed or destroyed. Water is the means ordinarily employed for this purpose, and large sums have been spent on sewerage and drainage systems. In some cases part of the sewage in the form of garbage is disposed of by burning it in large furnaces, the ashes being used as a fertilizer. Thoughtless persons and careless officials have often endangered the public health by emptying garbage on the public dump or by leaving it where it will decay and pollute the air. The public water supply is also poisoned at times by emptying garbage into the lakes and streams from which water for drinking and cooking is obtained.

For the consideration of this question and for determining the best means of solving the sewage problem, laboratories have been established by government, state, and municipal boards of health. These are now engaged not alone in analyzing sewage and determining the best means of removing or destroying it, but in diagnosing various infectious diseases so as to show the public their source and the necessity for the best sanitary systems to dispose of sewage and prevent its accumulation.

There are various means of sewage disposal or purification. Seaboard cities and some inland cities convenient to large streams are employing dilution by water. Chicago, for example, at an initial expense of $40,000,000 constructed its drainage canal, the main object being a dilution or removal to tilled soil of its accumulating sewage. In other places the septic tank is a popular means of sewage disposal. In still other cases refuse matter is fed to lower animals or is hauled away and used as a fertilizer. In all cases the prime object is the protection to health; and the problem of the best and the most economical way of disposing of sewage is one whose solution will engage the attention of sanitary engineers and of boards of health for some years to come.

Seward, sū′ard, **William Henry** (1801-1872), an eminent American statesman. He was a native of Orange County, New York. He was graduated at Union College in 1820. Later he entered upon the practice of law at Auburn. In 1830 he entered the state Senate as an Anti-Masonic legislator. He became associated intimately with Thurlow Weed and Horace Greeley. The three controlled Whig politics in the state of New York and practically in the nation. In 1839 they made Seward governor, and in 1849 they sent him to the United States Senate. They were instrumental in nominating and electing William Henry Harrison, the first Whig president. In 1858 Seward delivered his famous "Irrepressible Conflict" oration. The following sentence relative to slavery is the keynote:

> "There is an irrepressible conflict between opposing and enduring forces, and it means that the United States must and will sooner or later become entirely a slave-holding nation or entirely a free-labor nation."

In an earlier speech, he used the phrase, "higher law." It became the rallying cry of the Abolitionists, but caused the greatest indignation in the South. In 1860 Seward's friends in the Republican national convention considered him the logical can-

didate for president. He was defeated, however, by Lincoln. In making up his first cabinet, Lincoln conciliated Seward's friends and secured the services of one of the most sagacious men in the nation by making him secretary of state, a position which he held at the time of Lincoln's death. During the Civil War, Seward conducted the affairs of the United States with tact and ability. The Trent Affair and the interference of France with Mexico were handled in a masterly manner. On the night of Lincoln's assassination Seward was also attacked. He was stabbed severely, but escaped with his life. After retiring from office, he traveled extensively. In 1870-71 he made a journey around the world.

Apart from his services during the Civil War, Seward seems likely to be remembered chiefly by the purchase of Alaska, due to his far-seeing statesmanship. He lies buried at Auburn.

See ALASKA; LINCOLN; TRENT AFFAIR; MAXIMILIAN; AUBURN.

Sewing, ordinarily, the process of fastening together by means of a thread. Sewing differs from tying. In sewing the thread passes through the materials repeatedly. The ends of the thread may indeed be knotted to prevent their slipping through, but they are not tied together. In sewing each wrap of the thread is called a stitch. If two edges be sewed together the union is called a seam. The ordinary materials for sewing are fabrics, thread, and a needle, but none of these are essentials. The tailor bird, possibly the most ancient seamstress known, brings the edges of living leaves together, and, using her beak as an awl and a blade of grass or a shred of bark as a thread, constructs a pouch in which to build her nest. The relics of the lake dwellers of Switzerland and elsewhere include bone awls evidently employed in sewing primitive garments. The American Indian cut out the long sinew that runs parallel to the backbone of the deer; this he dried and separated into fibres, with which, and a bone awl and the tanned hide of the same deer, the patient squaw constructed buckskin moccasins and leggings for her family. The art of sewing has never been limited to the use of thread. Longfellow tells how the Chippewa used fibrous roots to sew the edges of birch bark together for a canoe. Soles are sewed to boots with wire. Sailmakers employ heavy twine in fashioning sails. Then, too, there are special forms of sewing, as sewing on a button, sewing up a wound, working a buttonhole, and quilting, which it is difficult to bring under any one definition. The *Century Dictionary,* noted for accuracy of definitions, disposes of the whole business by: "To unite, join, or attach by means of a thread, wire, or other flexible material, with or without the aid of a needle, awl, or other tool," a definition, it may be observed, broad enough to include lashing a spar to a mast, lacing a shoe, tying a horse to his manger with a halter, or tethering a tup to a tall tree.

To trace the history of sewing we should have to begin with primitive society and the earliest attempts to fashion garments and tents. The development of the subject would lead us into embroidery and tapestry, into lacemaking, and into weaving and knitting. Questions of clothing and costumes, of thread, and of needles, awls, and other implements would fill an instructive volume, but would lead us far beyond the limits of the article.

Sewing is considered a tedious task. "Stitch, stitch, stitch," says Hood in his *Song of the Shirt.* The sewing machine has lifted some of the drudgery, but fashion has added so much by way of ruffles, pleats, and other features that the amount of hand work has not been decreased materially. Division of labor has lifted the burden somewhat. Ready-made garments have come to the housewife's rescue. A thousand aprons are made in a shop at less expense of time and effort than would be possible in a thousand homes. For all that, sewing is a necessary household art, an accomplishment worthy of any woman in the land. Formerly sewing was an indication of rank. Women of degree taught the maidens of their households to sew. The sisterhoods taught sewing as carefully as drawing or music. Sewing was an accomplishment, not the everyday art of the peasant women. Even yet there are hundreds of Old World villages in which the women, accustomed as they are to field work, are unable to

sew. The village seamstress is called upon to make the few rude garments required.

Of late a marked tendency may be noted on both sides of the Atlantic to teach sewing in the public schools. This not merely to give practical knowledge, but to confer dignity not only on this subject but on the housekeeper's art in general.

Sewing Machine, a contrivance for stitching or sewing, the needle being driven by machinery instead of by hand. The eye of the sewing-machine needle is near the point. The point of the needle is thrust through the fabric carrying with it a loop of the thread. In sewing by hand, the needle is passed entirely through the fabric drawing the thread after it, but the needle of the sewing machine is simply thrust through the fabric and withdrawn again leaving a loop behind. The chain stitch is made with a single thread. The loop of each stitch passes through, and secures the loop of the previous stitch, very much as in the case of crocheting or knitting. In the lock stitch a second thread carried by a shuttle passes through the loops and secures them. The lock stitch is by far the safer as it cannot be raveled readily.

The credit of inventing the sewing machine has been ascribed to Elias Howe who took out a patent in 1846. He was not the first in the field, however, numerous patents having been granted previously both in England and France. A patent was granted in England in 1790. In 1841 a mob destroyed eighty sewing machines used in making clothing for the French army. Howe made several improvements. The lock stitch appears to be his invention. Other names associated with that of Howe are those of Bachelder, Wilson, and Singer, who patented various improvements, such as an automatic feed, an overhanging arm through which the needle is driven in a vertical direction, and so on. In 1855 the various inventors and companies between whom litigation had arisen came to an agreement whereby they consented to allow any manufacturer to use their devices on the payment of a royalty. From this time on the manufacture of machines increased rapidly. American machines excel, and millions of dollars worth of American sewing machines have been sold abroad in competition with British, French and German makes.

The sewing machine is numbered among the world's great inventions, and it has exerted an immeasurable influence over all industries relating to the manufacture of clothing in any form. The invention of a machine for sewing leather was a great step forward in the boot and shoe industry, and made possible the modern shoe factory. Machines have been perfected for doing practically all kinds of work done by the needle, such as embroidery, making buttonholes and sewing on buttons.

Practically all parts of a sewing machine are made by machinery, and factories specialize in the manufacture of these parts, one making needles, another shuttles, etc. The sewing machine manufacturer buys his parts at different factories and assembles them.

Seychelles, sā-shĕl′, an archipelago of thirty-four islands in the Indian Ocean a few hundred miles northeast of Madagascar. Many are mere uninhabited rocks. the peasants are primitive. Only fourteen The larger islands produce fine timber, vanilla, and a certain cocoanut that is not found elsewhere. The inhabitants are Africans. The group belongs to Great Britain. The Seychelles have present interest for Americans from the exhibition of a gigantic 450-pound tortoise at the St. Louis World's Fair. This venerable tortoise is known to be 150 years old, and is thought to be a century older. It is a representative of a race well nigh extinct. It is held in high esteem by the natives, but they were induced to loan the old settler to the fair, where he was greatly admired, and gave many schoolchildren a ride on his broad back. See TORTOISES.

Shackleton, Sir Ernest (1847-1292), a British explorer, died January 5 on board the steamship *Quest,* on which he was making an expedition into the Antarctic regions.

Mr. Shackleton was born at Kildare, Ireland, and educated at Dulwich College, England. He served in the commercial marine and as an officer of the Royal Naval Reserve. In 1901, he was lieutenant in the expedition commanded by Captain R. F. Scott which lasted three years.

In 1906, after service as an officer of the Royal Scottish Geographical Society, Shackleton financed, organized and commanded the Antarctic expedition which was distinguished for its remarkable achievements without fatalities. The mountains to the west were explored. Mount Erebus ascended, and the south magnetic pole reached for the first time. Eight small mountain ranges were discovered, also the King Edward VII Plateau, an enormous glacier, coal, and some other minerals. The expedition returned to England in 1909, when Shackleton was knighted.

With special permission from the British government, Shackleton again sailed for the Anarctic in 1914, returning after two years to enter the government service. He served with the British army in north Russia until 1919, and shortly after his release he organized the Shackleton-Rowett Oceanographical and Atlantic Expedition, financed by John Queller Rowett of the British Agricultural Research Laboratories and Frederick Becker, a paper manufacturer of England. Shackleton's death removed him from what promised to be the most notable expedition of the dauntless explorer's career.

Shad, an excellent table fish of the hering type. It is a sea fish from twenty-four to thirty inches long, and weighs from three to four pounds. There are four species. Two are found on the Atlantic Coast of Europe, one in the waters of the Gulf, and the fourth, the common American shad, is a native of the North American coast waters from Florida to Newfoundland. The last named ascends our Atlantic rivers in early spring to spawn. Shad are taken with nets or by casting. They are marketed extensively, fresh. The fisherman put them down also with salt in barrels for winter sale. The alewife, a smaller fish of similar appearance and formerly supposed to be a young shad, is taken likewise with nets and salted down for commercial purposes. Both are bony. The flesh of the shad ranks next to that of the trout in excellence. In point of commercial value to the American fisherman, the shad is surpassed by the salmon and the cod only. In the year of our last census, 49,780,530 pounds of shad were taken, worth $1,519,946. The shad is prolific. A single fish produces as high as 150,000 eggs in a season. See HERRING.

Shaddock, the handsomest tree of the orange group. It is a native of the Malayan and Polynesian Islands, and is cultivated in Florida, California, the West Indies, India, and other tropical and semi-tropical countries for its fruit, also called the shaddock. The tree attains an extreme height of forty feet. It has large ovate leaves and, like the orange, white flowers. There are several varieties. The fruit, which resembles the grapefruit, except that it is larger, weighing in some varieties as much as fifteen pounds, has a light yellow, in some cases a pink rind, which is very bitter.

Shafter, William Rufus (1835-1906), an American military officer. He was born in Galesburg, Michigan. He served as major, lieutenant-colonel, colonel, and brigadier-general in the Civil War. He distinguished himself in the campaigns under McClellan and took part in the battles of Fair Oaks, Savage Station, Glendale, and Malvern Hill. At the close of the War he remained in the regular army, and by 1897 he had risen to the rank of brigadier-general. In the Spanish-American War he commanded the army which invaded Cuba and occupied Santiago de Cuba when General Lenares surrendered with his 20,000 men.

Shaftesbury, Seventh Earl of (1801-1885), or Anthony Ashley Cooper, a great English philanthropist. He was born at London, of a noble family, and educated at Harrow and Christ Church, Oxford. From 1826-51 he was a member of the House of Commons, and upon his father's death in 1851 succeeded him in the House of Lords. Soon after his election he gave himself wholly to the reform of abuses then rife in England. He secured an act changing the treatment of the insane from the barbarous method then in use to a more humane mode. Other of his measures were those securing a ten-hour day for factory operatives, the famous act of 1842 which abolished horrible abuses in the coal mines, and forbade the employment of women, and children under thirteen, in the coal pits, and a measure known as the Climbing Boys' Act. At that time little children

from four to eight years of age, either orphans or the children of brutal parents, were sent up the long, winding, narrow passages of chimneys to clear out the soot. Their bodies were scratched and torn by the rough brick; they were rubbed with brine before a hot fire to harden the flesh. Often they were stuck in the chimneys and fainted from the fumes of sulphur. Sometimes they were killed by the efforts made to get them out. They went unwashed the whole week and became subject to a dreadful form of cancer as a result. In 1864 out of 384 examined by a commission of inquiry secured by the earl's efforts, only twenty-six could read and but half a dozen could write. Even on Sundays they were herded together in cellars, that the neighbors might not see their wretched condition. It would seem that if Parliament knew the facts nothing more would be necessary, but not until 1875 did Shaftesbury succeed in passing a measure which accomplished the setting free of these four thousand wretched children. The Ragged Schools were another of his charities. They were set up in the poorest parts of London, to minister to the wants of the city waifs and strays. The condition of public lodging-houses at that time was very bad; Lord Ashley, as he was called, secured the passage of a bill providing for their inspection and registration. His long life was busied with many other sorely needed reforms. At his funeral, which marked a day of mourning for all London, if not all England, a ragged laborer with a piece of crepe on his sleeve, turned to a bystander and said in a choked voice, "Our Earl's gone! God A'mighty knows he loved us, and we loved him. We shan't see his likes again!"

Shagreen, a kind of leather produced originally by oriental people from the hide of the horse, camel, or particularly of the ass. Sometimes the skin of the shark, sea-otter, or seal was substituted. In tanning the seeds of a species of goose-foot are embedded in the soft skin. The skin is then shaved and soaked. The pits in which the seeds lay swell up into relief, giving a peculiar granular appearance. The finished leather is dyed a rich green by a compound of sal-ammoniac and copper filings. Shagreen makes a luxurious binding for books and is used for expensive upholstering. The name is Turkish, meaning the back of a horse. See LEATHER.

Shah Jehan (1592-1666). See TAJ MAHAL.

Shah Nameh, shâh nâ-me′, in Persian literature, a celebrated epic poem by Abul Kasim Mansur, the greatest of Persian poets. Shah Nameh means Book of Kings, and the epic is a history of the kings of Persia down to 636 A. D. The poem was written during the reign of Shah Mahmud (940-1020). It consists of 60,000 couplets. The poet, called Ferdusi or Paradise by his countrymen, on account of the beauty of his verse, spent thirty years on the poem, having been promised a piece of gold for every couplet; but when the work was done, the monarch received it coldly, and sent the author 60,000 small pieces of money, instead of the gold. Ferdusi immediately wrote a stinging satire, which he sent to the king, betaking himself, meanwhile, to Bagdad, where his other poems soon won him fame. He added to his great poem a thousand couplets,—these in praise of the Caliph of Bagdad, and received from him the 60,000 gold pieces. The language of the Shah Nameh is the purest example extant of the ancient Parsee. See LITERATURE, PERSIAN; PARSEES.

Shakers, a religious society of the United States. They are known officially as the United Society of True Believers in Christ's Second Coming. The sect was founded by Ann Lee, a native of Manchester, England, the wife of a blacksmith. She emigrated to America in 1774 to escape persecution. She had become a convert to the Society of Friends. She disturbed the staid English by announcing herself as the prophet to whom Christ had appeared. She taught that at his second coming, he would take the form of a woman. She settled at Water Vliet, near Albany, New York, where she founded the first Shaker community. At her death in 1784 there were three communities. There are now fifteen societies extending from Massachusetts to Kentucky, —in all about 1,000 members.

Theologically, the Shakers are universalists. They do not believe in the resurrection of the body. According to the prin-

ciples and practices of Shakers, property is held in common. There is no marriage or giving in marriage. Married people who join the system are separated. The men and women occupy entirely different parts of the house. The men till the soil or work in the shops; the women do the housework and make the clothing. The communities are said to be models of neatness, both indoors and out. Tobacco and meat, including fish, are forbidden. Alcoholic liquors are served only as remedies.

Like the Quakers, from whom Ann Lee no doubt derived her original ideas, communities yield obedience to the laws of the country in which they live, but the men refuse to render military service. During the Civil War considerable discussion arose from the refusal of Shakers to serve, even when drafted; but President Lincoln took their part and ordered their release from imprisonment. They are an industrious, frugal, long-lived people. As the communities consist entirely of adults, they are dependent on the outside world for membership. The sect is declining rapidly in numbers. The common name of Shakers given to the sect by the world was derived from the ecstatic movements, leaping and shouting for joy, formerly a part of their services.

See COMMUNISM; SOCIALISM.

Shakespeare, shāks'peer, **William** (1564-1616), the greatest name in literature. Little is known of his life. He was born at Stratford-on-Avon. The Shakespeare home, a wooden frame filled in with masonry,—still stands. The father was a landholder and a dealer in gloves. Little is known of Shakespeare's education. Accurate and pleasing allusions to flowers, insects, birds, and trees, as the "nodding violet," "the ineffectual fire of the glowworm," "the mocking cuckoo," "the temple-haunting martlet," and "the sere, the yellow leaf," show that his mind was well stored with images and that his youth was not misspent. Some account is at hand of time spent in a lawyer's office, and of the trial of himself and companions for deer-stealing. Sir Thomas Lucy, the owner of the deer, is caricatured in Justice Shallow of the *Merry Wives of Windsor.*

One of "Will" Shakespeare's favorite rambles across meadows and over hedge styles led evidently to a cottage where Anne Hathaway lived. The garden, thatched roof, low doorway, heavily beamed sitting room, wide fireplace, oaken settle, and furniture are kept as they used to be when Will, eighteen, and sweet Anne, twenty-six, afterward his wife, kept company. The cottage is now a literary Mecca. A book of visitors is kept. It bears the signatures of most Americans known in literature, as well as that of U. S. Grant and other public men.

About 1586 Shakespeare went to London, evidently to seek fame and fortune. Here he became an actor, a mender of old plays, and a writer of new ones. The Globe and Blackfriars theaters, situated on the Strand, then fronting the Thames, were the scenes of his triumphs. After twenty-five years of London he returned to Stratford, where his savings had been invested thriftily in property that brought him in a good rental. He established his family here in the best house in town and took more comfort, no doubt, in his worldly prosperity than in his plays, which he is said to have considered faulty enough.

He died on the anniversary of his own birthday, April 23, 1616, and was buried in the chancel of the parish church. An inscription on the memorial stone, composed, it is thought, by himself for the purpose, runs:

> Good frend, for Jesus sake forbeare
> To digg the dust encloased heare;
> Bleste be the man that spares thes stones
> And curst be he that moves my bones.

Shakespeare's writings may be separated into poems and thirty-seven plays. His poems are *Venus and Adonis, Lucrece, The Passionate Pilgrim,* and his *Sonnets.*

The generally accepted classification of plays is as follows:

1. HISTORICAL TRAGEDIES.
   - Henry VI, Part I.
   - Henry VI, Part II.
   - Henry VI, Part III
   - Richard II.
   - Richard III.
   - King John.
   - Henry IV, Part I.
   - Henry IV, Part II.
   - Henry V.
   - Henry VIII.

2. SEMI-HISTORICAL TRAGEDIES.
   Titus Andronicus.
   Hamlet.
   King Lear.
   Macbeth.
   Julius Caesar.
   Antony and Cleopatra.
   Coriolanus.
   Cymbeline.
3. FICTIONAL TRAGEDIES.
   Romeo and Juliet.
   Timon of Athens.
   Othello.
4. FICTIONAL COMEDIES.
   Much Ado About Nothing.
   Twelfth Night.
   As You Like It.
   Taming of the Shrew.
   Pericles.
   Merry Wives of Windsor.
   Measure for Measure.
   All's Well That Ends Well.
   Love's Labor Lost.
   Comedy of Errors.
   Two Gentlemen of Verona.
   Midsummer Night's Dream.
   Merchant of Venice.
   Troilus and Cressida.
   Winter's Tale.
   Tempest.

A reasonable acquaintance with Shakespeare is essential to an understanding of literature. An intelligent person desires to understand such allusions as the ingratitude of King Lear's daughters, the jealousy of Othello, the madness of Hamlet, the advice of Polonius, the judgment of Portia, the choice of the caskets, and the grossness of Falstaff.

Next to the Bible, Shakespeare's writings are the greatest mint of words and quotations. The extent to which quotations from Shakespeare have passed into proverbs is well put by a critic who humorously states that Shakespeare lacks originality. One cannot read a page of his writings without coming upon familiar thoughts and expressions. Lowell is of the opinion that the apt expressions for which Shakespeare is noted were not coined by him, but were caught from the people and used because they expressed his meaning and could be understood by everybody. "A woman's reason," "passing fair," "what the dickens," "a little brief authority," "a mere anatomy," "good men and true," "true as steel," "beginning of the end," "feed fat the ancient grudge," "staff of my age," "in the twinkling of an eye," "the quality of mercy," "a Daniel come to judgment," "the uses of adversity," "tongues in trees," "sermons in stones," "lack-luster eye," "better days," "*sans* teeth, *sans* eyes," "bag and baggage," "gallop of verses," "warrant heart whole," "budge an inch," "poor but honest," "at fingers' ends," "a horse of that color," "the jaws of death," "as like as eggs," "a twice-told tale," "to paint the lily," "elbow room," "give the devil his due," "a trick worth two of that," "mine ease in mine inn," "the winter of our discontent," "grim visaged war," "my kingdom for a horse," "the most unkindest cut of all," "what a fall," "the milk of human kindness," "vaulting ambition," "the wine of life," "moon in russet mantle clad," "every inch a king,"—these are a handful of the coins original or otherwise to which Shakespeare has given currency.

The following lines are a few of the many that have been quoted so often, and with so many variations, that they have passed into the common fund of speech from which writers draw freely without further need of giving credit:

Doubts are traitors.
Beware the ides of March.
Thereby hangs a tale.
My cake is dough.
Fling away ambition.
Lend me your ears.
When shall we three meet again?
Stand not upon the order of your going.
Throw physic to the dogs.
That this too too solid flesh would melt.
Give thy thoughts no tongue.
Beware of entrance to a quarrel.
Something is rotten in the state of Denmark.
The time is out of joint.
One may smile and smile and be a villain.
Let the galled jade wince.
The game is up.

The sand heaped by one flood is scattered by another, but the rock always continues in its place. The stream of time, which is continually washing the dissolute fabrics of other poets, passes without injury by the adamant of Shakespeare.—Samuel Johnson.

See DRAMA; GLOBE THEATER; STRATFORD; IRVING.

Shale, a hardened clay made solid by the weight of sediments above it. The "slate" found in coal beds is really shale. There are various kinds of shale, many of which are very useful. One kind is used in the manufacture of fire-brick, another in mak-

ing ordinary brick, and a third in the manufacture of mineral paint. Still another is valued in the production of Portland cement. One variety of shale when mixed with water behaves like common clay; another, bituminous shale, crackles and blazes in the fire like coal. Crude petroleum is obtained from such shales. When shale undergoes further changes it may become, according to conditions, slate, schist, sandstone, or limestone.

Shamanism, a name given to the religious beliefs of the North American Eskimos and of certain North Asiatic tribes. These people believe in a supreme deity who is good, but that the fortunes of man are for the most part determined by a group of inferior and malevolent deities or spirits, of whom they are in terror.

Shamokin, Pa., an industrial borough in Northumberland County, is 39 miles northeast of Harrisburg, in a productive anthracite coal field. It is served by the Pennsylvania and Philadelphia & Reading railroads. Coal is the important commercial item, and there are manufactories of structural iron, knit goods, stockings, shirts, silk and other commodities.

The city has a large park, good schools, a library and a Federal building. In 1920 the population was 21,204.

Shamrock, the national emblem of Ireland, corresponding to the rose of England and the thistle of Scotland. The word is an old Irish name for clover. St. Patrick is said to have used the three leaves to teach the doctrine of the Trinity. To avoid confusion, it may be well to remember that English writers frequently speak of the clover as trefoil. A small yellow hop clover is sold on the streets of Dublin as the genuine shamrock.

There's a dear little plant that grows in our isle,
'Twas St. Patrick himself, sure, that set it;
And the sun on his labor with pleasure did smile,
And with dew from his eye often wet it.
It thrives through the bog, through the brake, and the mireland,
And its name is the dear little shamrock of Ireland.
The sweet little shamrock, the dear little shamrock,
The sweet little, green little, shamrock of Ireland! —Andrew Cherry.

Shanghai, shăng-hä'ĭ, a city of China. It is situated on a short river, twelve miles above its entrance into the estuary of the Yang-tse-kiang. It is situated, therefore, near the most easterly point of central China. It is the natural outlet for one of the largest and most highly cultivated regions on the globe. The Chinese city is surrounded by brick walls pierced by seven gates. The streets are narrow, crooked, and dirty beyond description. There are no native buildings of architectural prominence. Aside from its commanding commercial position, the city may be said to be without interest. Shanghai was opened to foreign commerce in 1843. The French and English, and later the Americans, formed settlements below the city and without its walls. They form a continuous suburb, and have leagued together for mutual protection and police duty, forming a considerable and well built city of their own.

The river forms a commodious and safe anchorage for large ships. Quays extend along the water frontage for many miles. The wharfage is divided up into sections. Foreign ships, as well as Chinese vessels, cast anchor, each under the protection of its national flag. The English quarter, in particular, presents a frontage of imposing government buildings. A complete system of canals, chains of lakes, and railways connect Shanghai with the adjacent region. Shanghai is the great Chinese seat of export for tea, cotton, raw silk, silk goods, rice, hides, and native cloths. The principal imports are opium, cutlery, hardware, kerosene, coal, and sugar. American trade with China is conducted chiefly through the merchants of Shanghai. The consulate is an important one.

Shanghai is a center of missionary effort. The London Missionary Society, the American Presbyterian Mission, and the French Society for the Dissemination of the Faith have headquarters here. Hospitals, printing presses, and other means for the conversion and improvement of the natives are maintained on a scale unknown elsewhere in China.

The climate is much like that of Charleston, South Carolina, with the disadvantage, however, that the city is located on low, muddy ground, and is subject constantly to malarial fevers. The old city

lacks sanitation. The winters are, on the whole, pleasant. Snow and ice are seen, usually for a short time. The summers are swelteringly hot. Europeans find it necessary to go elsewhere into the mountains or to seaport resorts to recover their strength. Were it not for the opportunity of making money, Europeans would desert the city. The population in 1920 was 1,538,000. The population of the foreign quarter was about 12,000. The English and Scotch predominate.

See CHINA.

Shannon, a river of Ireland. It is the largest river in the United Kingdom. It rises in the north central part of Ireland and flows in general south and southwesterly through several large lakes, becoming a tidal estuary at Limerick. The total length is about 254 miles. Several million dollars have been spent in improving navigation between Lough Allen and Limerick. The Shannon is connected with Dublin and other ports of Ireland by a system of canals. See IRELAND; LIMERICK.

Shark, a voracious fish of the deep sea. Sharks in an arm of the sea are as active, as destructive, and ever-hungry as pickerel in a small pond. The common man-eating or white shark of the Mediterranean and other warm waters attains a length of fifteen to twenty feet, and in extreme cases over thirty feet. Its snout projects over its mouth. Its jaws are fitted with formidable, triangular teeth two inches long. The two jaws close together like immense saws. The teeth of one fit the depressions of the other, and not only that, but there are six rows in the upper jaw and four in the lower. The shark has a full set of fins and a forked tail. It will follow a ship for days for the sake of the offal thrown overboard. Sharks are exceedingly dangerous in certain waters. A man lost overboard or caught swimming is likely to be cut in two by a single snap of those ponderous saw-like jaws before help can reach him.

Sailing ships lying becalmed or moving slowly in tropical waters offer opportunity for fine sport,—shark fishing. A large hook is baited with a piece of meat and thrown out astern with a chain for a fishing line, for the shark would cut the strongest cable. If the shark bites he is hauled aboard with a capstan and is chopped into pieces. Sailors insist that a "man-eating" shark is accompanied by a mackerel-like "pilot" fish, sometimes by several, who aim to keep him from harm and are distressed when he comes to grief. The shark family is a large one. There are 150 species.

Sharon, in sacred geography, a plain in Palestine extending along the coast from Joppa to Carmel. The plain of Sharon was noted for fertility. The celebrated rose of Sharon, or Syrian hibiscus, still grows, a much branched shrub, five to six feet high. The flowers resemble those of the common garden hollyhock. See HOLLYHOCK.

Sharon, Pa., an important industrial city, is on the Shenango River and on the Erie, Pennsylvania, Lake Shore & Michigan Southern and Pittsburgh & Lake Erie railroads, 75 miles northwest of Pittsburgh. Iron and steel products, including ordnance, sheet steel, boilers, nails, chains, stoves, furnaces and machinery are the most important manufactories, and there are explosive mills and flour mills.

Sharon was settled in 1795 and was incorporated as a borough forty-six years later. The population increased from 15,270 in 1910 to 21,747 in 1920.

Shaw, Anna Howard (1847-1919), a woman preacher and suffragist. She was born at Newcastle-on-Tyne, England, but was brought to this country when four years of age. She studied at Albion College, Michigan, for three years, then graduated from Boston University, first in theology, and later in medicine, 1885. During her college and university courses she earned her expenses by lecturing and preaching, for she had been granted a local preacher's license by the district conference of the Methodist Episcopal Church. She was refused ordination by the Northeastern Conference of that church because she was a woman, and after appealing to the general conference, was again refused on the same grounds. In October of that year she was ordained by the Methodist Protestant Church, and continued her pastorate at East Dennis, Massachusetts until 1885, the same year, it will be noticed, in which she completed her studies at Boston University. Then she resigned from the pulpit to be-

come the lecturer for the Massachusetts Woman's Suffrage Association. In 1904 she became president of the National American Woman's Suffrage Association.

Shaw, George Bernard, (1856——), an Irish dramatist, essayist and critic, born in Dublin, Ireland. His early education was limited. In 1876 he went to London where he became actively interested in socialism. He joined the Fabian Club, wrote articles for magazines and spoke on street corners. He is the author of four novels, *The National Knot, Love Among Artists, Cashel, Byron's Profession,* and *An Unsocial Socialist.* His most noteworthy essays are *The Quintescence of Ibsenism* and *The Perfect Wagnerite.* He is the author of over twenty works for the stage which are not considered plays by some dramatic critics, because they ignore most of the principles of dramatic writings. His characters argue, usually on some social problem, but they rarely feel or act. His best known plays are *Widowers' Houses, Candida, Major Barbara, Man and Superman, The Doctor's Dilemma, Getting Married, The Sewing Up of Blancho Posnet,* and *Fanny's First Play.*

Shaw, Henry W. (1818-1885), an American humorist, widely known by his pen name, Josh Billings. He was born at Lanesboro, Mass. After a limited education, he began his career as an auctioneer, in which capacity his wit made him popular. Meantime he wrote articles for the local paper over the signature of Josh Billings. In 1866 his first book, *The Sayings of Josh Billings,* appeared. He was a popular lecturer and a regular contributor to the *New York Weekly.* His other works are *Josh Billings' Complete Works, Josh Billings' Trump Card.*

Shawinigan Falls, Quebec, an industrial city in St. Maurice County, is on the St. Maurice River and on the Canadian Northern and the Canadian Pacific railroads, 21 miles north of Three Rivers and 98 miles southwest of Quebec. Near the city are the Shawinigan Falls, 165 feet high, which generate power for manufacture. The principal products of the city's industrial plants are manganese, aluminum, carbide, paper and pulp, abrasive materials, cotton goods, sash and doors, knit goods, electrodes, carborundum and fero alloys.

Shawinigan Falls has seven public schools, a technical school, Roman Catholic and Protestant churches, and a library. The most notable buildings are the city hall, opera house, post office and market buildings. The residents numbered 10,625. in 1921.

Shawl, a well known garment worn loosely over the shoulders. The shawl is a mere oblong or square piece of cloth, without sleeves or fitting to the waist. It was an article of dress, doubtless, from the earliest antiquity. Before they were set aside by cloaks and overcoats, shawls were worn by men as well as women. Ordinary shawls are too well known to warrant description. Paisley, Scotland, is famous for the manufacture of serviceable woolen shawls.

Shawnee, Okla., an industrial city, is on the North Canadian River and the Atchison, Topeka & Santa Fe, Missouri, Kansas & Texas and Chicago, Rock Island & Pacific railroads, 37 miles southeast of Oklahoma City, the state capital. It is a trading center of importance, contains the shops of the Santa Fe and Rock Island railroads, and has manufactories of clothing, machine shop products, flour and cotton products.

Interesting features of the city are the muncipal buildings, Carnegie library, a large high school, Baptist and Catholic universities, and several parks. Shawnee was settled in 1895 and chartered as a city in 1896. In 1920 the inhabitants numbered 15,348.

Shawnee Indians, a powerful tribe of Algonquin stock. Of their early migrations no certain information is at hand. They are believed to have been an offshoot of the Delawares. They appear to have been buffeted by the Cherokees, Chickasaws, and Creeks on the south and by the Five Nations on the north. White settlers came into serious conflict with the Shawnees in the Ohio Valley. "Mad Anthony" Wayne won a victory over them in 1795. Chief Cornstalk was a Shawnee. The Indians encountered by Boone and his companions

in the settlement of Kentucky were chiefly Shawnees. Tecumseh and his brother, the Prophet, were Shawnees. They organized an extended Indian uprising which was put down by General Harrison at Tippecanoe in 1811. It is believed that at this time the Shawnees numbered not less than 2,000 warriors. Scattered remnants joined the Tuscaroras in New York and the Teton Sioux in North Dakota. A small village is said to have followed a party of trappers west to the Tulare Valley, California. After various vicissitudes, however, the villages of the Shawnees were concentrated in Indian Territory, the great reservoir of broken Indian tribes. Men, women, and children, they now number less than 1,000. See WAYNE, ANTHONY; TIPPECANOE; TECUMSEH.

Shaw's Garden, a popular name for the Missouri botanical garden at St. Louis. It was founded in 1849 by Henry Shaw, a prosperous hardware dealer of the city. Mr. Shaw came from Sheffield, England, the city of cutlery, to St. Louis in 1819 in time to profit by the immense plains business and Santa Fé trade. He began his garden simply as a gentleman's modest suburban grounds, but increasing interest and increasing wealth led him to purchase adjacent land and lay out an extensive arboretum after the fashion of European plant gardens. From this time on the garden became the ruling passion of Mr. Shaw's life. By special legislative enactment he was authorized to provide for the maintenance of his garden as a perpetual school of science. Mr. Shaw endowed a chair of botany in Washington University, and at his death left $5,000,000 for the maintenance of his garden and for botanical investigation. For many years the garden and herbarium have been in charge of Director William Trelease. The groves, grounds, library, laboratories, and extensive hothouses—illustrating palms, orchids, ferns, tropical fruits, and flowers—are open to visitors under the most reasonable rules. Mr. Shaw left the management of the chair and gardens to the judgment of trustees, making special provision in his will for flower premiums, an annual sermon "on the wisdom and goodness of God as shown in the growth of flowers, fruit, and other products of the vegetable kingdom," and for two annual banquets, one for the trustees and one for the gardeners of the institution. The "Shaw banquets" are notable affairs, attended by botanical guests from a distance.

Shays' Rebellion, an uprising in Massachusetts, 1786-87. At this time discontent was rife in the colonies. Poverty, instead of prosperity, seemed to follow in the wake of independence. The common people, in particular, were unemployed, or their products brought low prices. They were deeply in debt. Salaries were out of proportion to what a workingman could earn. Taxes, though low in comparison to what the descendants of these men now pay, were for the time exorbitantly high. Debtors' laws were stringent. Strong men were thrown into prison and allowed to languish there for no other reason than that they owed someone whom the people considered comparatively able to get on without payment. There were uprisings in Pennsylvania, in New York City, and in New Hampshire. Shays' rebellion in Massachusetts was merely the climax. The Massachusetts judges went from town to town, holding court. They were accompanied by a horde of lawyers engaged in seizing goods and foreclosing mortgages. Genuine distress prevailed.

At this juncture Captain Daniel Shays, who had been an ensign at the battle of Bunker Hill, and who won the title of captain in the Continental army, took it upon himself to prevent the courts from sitting and distressing the people by issuing warrants and granting judgments for debts. He surrounded the court at Springfield with an armed force, until the supreme court, after three days, adjourned without finding indictments. He filled the courthouse at Worcester with armed men, so that the court could not sit. A riot forced the court to give up its sessions at Great Barrington. Early in 1787 Captain Shays got together a force, reputed to be 1,800 men, and made an attack on the Springfield arsenal guarded for a time by a force of militia under General Shepard. According to one account four of Captain Shays' men fell before a volley directed into their ranks. Captain Shays and 150 men were arrested,

but later amnesty was proclaimed. Shays was pardoned and went to Sparta, New York, where later he obtained a pension for his Revolutionary services. Washington, with all his love of justice, failed to see the popular side of the situation. He was of the opinion that something stronger than moral suasion was needed to calm these disorders, and wrote to Lee, then in Congress: "It was but the other day that we were shedding our blood to obtain the constitutions under which we now live—constitutions of our own choice and making—and now we are unsheathing the sword to overturn them."

Sheboygan, shē-boi′găn, a city in Wisconsin at the mouth of the Sheboygan River and on Lake Michigan. It is about fifty miles north of Milwaukee. During the open season a line of steamers plies regularly from Sheboygan to Milwaukee and Chicago. It has steamship connection with all the principal lake ports. Furniture is the leading manufacture, particularly chairs. Other products are leather goods, shoes, excelsior, knit goods, enameled ware, pianos, bricks and lime, lumber, foundry products, and boilers. There are handsome public buildings, a hospital, an asylum for the insane, and a Carnegie library. Other industrial establishments are the shipyards, and bottling works for celebrated mineral waters found there. The city has large coal docks, for which commodity it is a distributing center for the Northwest. The population in 1920 was 30,955.

Sheep, a well known domestic animal. Scientifically speaking, a genus of cud-chewing quadrupeds. The ancestor of the domestic sheep is not known. All wild sheep have short tails, while the domestic sheep has a tail that reaches to the ground, unless shortened by the shepherd. Sheep are allied closely to goats. They have, however, spiral horns and the chin is destitute of a beard. As all wild sheep are natives of elevated or mountainous regions, it is probable that domestic sheep originated in the mountains of Asia. The most celebrated breed is the Spanish merino, noted for fine wool and hardiness. The English types, the Cheviot, the Leicester, the Southdown, and the black-faced breeds, have long, straight wool and are noted for mutton.

The first sheep were brought to the new world by Columbus in 1493. Spanish explorers introduced sheep into Florida in 1565. The Spanish missions brought sheep to Mexico and the southwestern part of the United States at an early date. When these missions in California were disestablished and the property confiscated by the Mexican government in 1834, there were large flocks amounting to over a million head. An excellent account of sheep raising in this section may be read in Helen Hunt Jackson's *Ramona.*

The English introduced sheep into Virginia in 1609. They were so harassed by wolves, however, that forty years later the number did not exceed 3,000. The Dutch brought sheep to New Amsterdam in 1625. The Swedes of New Jersey and Delaware had flocks of sheep when they passed under English rule. The first sheep were introduced into New England about 1624. The sheep of Florida and the far southwest were of the merino type. Those of the Atlantic seaboard, as far south as Georgia, came from England. The question of long, coarse-wooled mutton sheep, *versus* fine-wooled merinos is still open. Breeders at the present time are trying to develop fine wool on mutton bodies.

Sheep raising is a profitable branch of industry. The sheep lives on the roughest kind of forage and is a very moderate eater. The fleece yields an annual income. Mutton is a wholesome food. If we except hogs, no other kind of live stock brings in so immediate a return. A flock of sheep multiplies rapidly with corresponding increase in value.

The male sheep is known as a ram, the female as a ewe, the young as a lamb. The wool of a single sheep is a fleece. An oil found on the wool is known as eke. The ewes may be expected to have lambs when a year old. So many ewes produce twins that with fair care a flock of ewes may be expected to double in number the first year.

In brushy countries a flock of sheep will do more clearing than a force of men. There are, however, drawbacks. Young lambs are exceedingly tender, and must be cared for well, at least for a week or two. Sheep are such climbers that it is difficult to restrain them in pastures. Wolves com-

1 Merinos 2 Rambouillets 3 Southdowns 4 Shropshire Buck

COMMON VARIETIES OF SHEEP

DIPPING SHEEP FOR SKIN DISEASE

Moufflon, Southern Europe.

Marco Polo's sheep, Himalayas.

Bighorn, Rocky Mountains.

Argali, Asia.

SHEEP.

mit frightful ravages. Dogs destroy large numbers of sheep annually. It is said that a dog addicted to sheep killing cannot be cured of the habit. Sheep raisers declare that dogs kill more sheep annually than the whole tribe of dogs is worth. On the sheep ranges of the plains, the coyote, or prairie wolf, is the shepherd's wiliest foe. He soon learns to avoid poison. A great deal of antagonism exists between the sheep and cattle raisers. No greater insult can be offered a cowboy than to call him a sheep herder. Sheep bite so close to the ground as to destroy the grass on large areas.

The greatest profits are made, no doubt, in the West where sheep pasture on buffalo grass without winter shelter or feeding. Bands of shearers begin work in the far southwest and travel northward with the season. They charge five cents a head for shearing. The business of bringing sheep from the plains eastward and fattening them for market on wheat screenings and other grains, has grown to large proportions.

The United States produces about one-ninth of the world's mutton and wool. The English wool and mutton market is supplied largely from Australasia and Argentina. Frozen carcasses of mutton are shipped to London and other British cities in refrigerated ships. Wool is carried from these countries to London for one-half cent a pound.

Other countries bring the wool production of the year up to the incredible total of 2,605,000,000 pounds. As to what becomes of so much wool, we have only to remember that Great Britain alone has nearly 50,000,000 spindles engaged in spinning wool and cotton. The greater part of the world's production of wool finds its way into clothing.

Mohammedans are forbidden to eat swine's flesh. Mutton, therefore, is a favorite food with them. In Persia, Tartary, Syria, and Morocco they have developed breeds of sheep remarkable for accumulations of fat. Pouches of fat descend from the rump to such an extent as to obscure the tail. It is said, we do not know on what authority, that in this way the tail of the Syrian sheep attains a weight of from thirty to sixty pounds. In fattening choice specimens a pair of wheels is provided for the support of the tail.

See Tick; Foot Rot; Spinning; Shoddy; Goat; Clothing; Felting; Fleece.

Sheep Dog. See Dog.

Sheepshead, an esteemed food fish of the Atlantic Coast. In shape and coloring this fish resembles the sunfish and the crappie, but it attains a length of thirty inches. It is related to the sea-bream.

Sheeptick. See Mite.

Sheffield, a manufacturing city of Yorkshire, England. It was noted in the time of Chaucer for the manufacture of edged tools. It is still the center of the British cutlery trade. The Bessemer process of making steel was put into practical operation first at Sheffield. The manufactures embrace almost every sort of implement, instrument, and edged tool known, including knives, razors, scissors, surgical instruments, mechanical instruments, carpenters' tools, saws, scythes, sickles, spades, shovels, hammers, and vises. There are also enormous manufactures of stoves, grates, engines, steel rails, tires, axles, and ship armor. In 1921 the population was about 490,724 The city has no buildings of historical importance comparable to Westminster Abbey or the Tower of London, but it is a city in which municipal problems can be studied to great advantage. Millions of dollars have been expended in straightening and widening streets and in erecting modern homes for workmen. Public parks, schools, colleges, sewerage, lighting, water supply, and tramways have been managed with a degree of honesty and efficiency that shame the average American city. See also Cutlery.

Sheik, the chieftain of an Arab tribe or village. The word is Arabic signifying an old man, an elder. A traveler desiring to transact business of any sort with Arabs does so through their sheik. Among the Mohammedans generally the term is one of respect. The venerable grand mufti of Constantinople, the highest authority in matters of sacred law in the Turkish Empire, is called Sheik ul Islam.

Shekel, shĕkl, the Hebrew name of a weight and coin used first in Babylonia. The shekels of Babylonia, Assyria, Phoenicia, and Palestine varied considerably. The

shekel of the Jews contained from 212 to 220 grains of silver, equivalent, speaking roughly, to a silver half dollar.

Shell, in natural history, the limy home of a mollusk. The body of the crayfish and the lobster secretes a limy covering; the coral builds a limestone home; the starfish, the sea-urchin, the sea-cucumber, and many other animals, chiefly marine, live in lime houses; but, in ordinary usage, a shell is the protection of a mollusk. The shells that live in the ocean, that strew the seashore, and that may be gathered in rivers and ponds may be classified in three groups: the shells of cephalopods, gastropods, and bivalves.

Whatever the shape or size of a shell, it consists for the most part of carbon and lime, the constituents that enter largely into bone and the shell of eggs. This carbonate of lime, as the compound is called, forms from ninety up to ninety-nine per cent, by weight, of the matter in a shell. By burning, the carbon may be removed, leaving the lime. Lime obtained in this way is sometimes used by residents of the seacoast to make plaster. The material of the shell is obtained by the animal from its food and sea-water, quite as land animals obtain the material entering into the composition of bone.

Shells vary in size from miscroscopic shells to shells too heavy for a man to carry. The two valves of the giant clam weigh 500 pounds. Some mollusks, as the cuttlefish, do not have a true shell, but an interior plate, like the porous cuttlefish bone placed between the wires of a cage for the canary to pick at. Other shells are thick, hard, and capable of withstanding heavy blows. Many shells are covered with long, spiny projections, the use of which is not understood. The shells of bivalves are composed of two pieces or valves, as in the case of the oyster, clam, and mussel. The shells of gastropods are univalve or one valve. The shell of the limpet is shaped like a saucer; the shell of the snail and the whelk is conical and spiral or else coiled flat. The spiral mouth is coiled usually, but not always, in the direction opposite to the movement of the hands of a watch.

Shell has many uses in the arts. Seashore dwellers burn shells for the lime they contain. American roadmakers, in the tidewater region, use oyster shells for surfacing. Farmers in the maritime provinces of Canada use "mussel-mud," consisting of shells, mud and slime from decaying oyster beds, as a fertilizer. The pearly shell of the oyster and clam is much used for inlaid work. Ground into a powder it is employed by the Japanese for lacquer work. Several thousand tons of shells, American mussel, are converted into buttons yearly. London merchants buy shells to the value of $4,000,000 yearly. Oyster shells are crushed for laying hens. The cowry shell passes current in parts of Africa as money. Primitive people use shells for domestic utensils. The Filipino uses plates of a certain transparent shell as a substitute for window glass.

See CONCH; COWRY; SNAIL; NAUTILUS; OYSTER; CLAM; MUSSEL; BUTTON; PEARL, etc.

Shell, in warfare, a projectile, used by artillery. Formerly the term applied only to a hollow projectile filled with a powerful explosive and often containing bullets that were scattered by the explosion. The term now includes any projectile used by artillery. Shells used by the field artillery in the World War were usually of the shrapnel type. Those used by the British were fired from 3-inch guns and weighed eighteen and a half pounds. Those used by the Germans weighed fourteen pounds.

Shells used in siege guns are much heavier. Those used in the German siege guns were effective against any armor plate, or fortifications construced of masonry. A 6-inch howitzer fires a shell weighing 122 pounds and has an effective range of four miles; a 12-inch gun will fire a projectile weighing 981 pounds; and a 14-inch will fire one weighing 1,400 pounds. Each has a range of eleven or twelve miles.

Projectiles designed for the navy are tempered to the highest degree of hardness, so that they can penetrate the armor plate of battleships. A 16-inch gun will fire a shell weighing approximately 3,000 pounds and is effective over a range of twelve miles. No armor can resist the penetrating force of such a projectile. See CANNON.

Shellac. See LAC.

Shelley, Percy Bysshe (1792-1822), an English poet. He was a native of Sussex. His mother was a woman of beauty but without literary taste. His father was an obstinate member of Parliament, said to have been imbued with rather low views of life. Shelley was educated at Eton and at Oxford. He disliked mathematics, but showed a fondness for Plato, Hume, and French writers. He was a tall, handsome young fellow; in matters of the orthodox religion an unbeliever, but tolerant, and in his theory of government an advocate of liberty. In conversation he is said to have been pure-minded—not only graceful and delicate in his choice of words but recoiling from coarse and unworthy topics.

While in Oxford Shelley was summoned before the faculty, and, refusing to answer questions regarding an anonymous atheistical pamphlet based on Hume's writings, he was expelled summarily. His father was enraged and cut off his allowance. He was forbidden to return home. In this strait he went to London where his sisters were attending school, and lived on their pin money, which they were glad to give their handsome brother. His father finally became so far reconciled as to allow him $1,000 a year. His expulsion from college took place in March, 1811; in August of the same year he ran away with Harriet Westbrook, a pretty school friend of his sisters, and was married in Edinburgh.

For some years he moved here and there, living happily with his wife and children at York, Keswick, Dublin, and lastly in London. Here he met a beautiful young woman, a Mary Godwin, a brilliant intellectual "affinity" with whom he ran away to Switzerland and lived in open defiance of marriage laws. His unfortunate wife fell into evil ways and drowned herself; whereupon Shelley and Miss Godwin were married, and took up their residence near London. So much for the good and the evil in Shelley's private life. Shelley's father supplied him later with an income of $5,000 a year. While sailing in his own schooner off the coast of Greece, a sudden squall overturned his bark. He and two companions were drowned. Their bodies were recovered and were cremated. His ashes were taken to Rome and buried in the Protestant burying ground.

As a poet Shelley is associated with Keats and Byron. He is considered the most exquisitely poetical, the most divinely enraptured, poet of England. *Queen Mab* is one of his earlier productions. *Alastor, The Revolt of Islam, Prometheus Unbound,* and *Cenci* are other titles. *Adonais* is a lament for the death of Keats. It ranks with Lycidas. He reaches the height of his poetic flight, however, and indeed the greatest altitude attained by English poet, in the *Skylark* and the *Cloud*. Quotations may be found under those headings. See also KEATS.

Shenandoah, a river of northern Virginia. The Shenandoah flows northwestward between the Blue Ridge and a parallel chain of the Alleghanies, through the eastern county of West Virginia, into the Potomac River at Harper's Ferry. The Shenandoah Valley is noted for beauty and fertility. It was the scene of Stonewall Jackson's forced marches and of Sheridan's ride.

Sheol. See HELL.

Shepherd Dog. See DOG.

Shepherd's Purse, a common dooryard weed from Europe belonging to the mustard family. Like peppergrass, which it somewhat resembles, it has a pungent, peppery taste. The name is derived from the peculiar seed pods, suggestive of a shepherd's purse. These pods are triangular in form, with a heart-like notch in the wide upper end. On examination they are found to be flattened contrary to a narrow partition which divides the pod into two compartments. A single plant is said to produce as high as 64,000 seeds. The flowers are small, white, and inconspicuous. The stem, which is much branched, springs from a cluster of toothed root-leaves. The stem-leaves are arrow-shaped and sessile.

Sheridan, Philip Henry (1831-1888), an American general. He was born at Albany, New York, March 6, 1831. He died at Nonquitt, Massachusetts, August 5, 1888. As a lad he clerked in a store. The Mexican war led him to become a soldier. He was graduated at West Point in 1853, standing thirty-fourth in a class of fifty-two. Prior to the Civil War he served in

William Shakespeare.

George Noel Gordon Lord Byron.

Percy Bysshe Shelley.

Sir Walter Scott.

Charles Dickens.

Rudyard Kipling.

ENGLISH WRITERS.

the West as a lieutenant. He rendered service in the Oregon Indian war of 1856. In 1861 he was promoted to be a captain of infantry, and was made quartermaster to the Union army in southwestern Missouri. The following year, at his earnest request, he was appointed colonel of a Michigan regiment of cavalry, and later in the same year was made a brigadier-general. He took part in the battles of Chickamauga and Chattanooga. In 1864 Grant transferred him to the army of the Potomac and made him commander of his cavalry. At this time Sheridan weighed 115 pounds. President Lincoln thought him too small for so important a post. "The officer you brought on from the West seems rather a little fellow to handle your cavalry." Grant replied: "You will find him big enough for the purpose before we get through with him."

Sheridan took part in the battles of the Wilderness, Spottsylvania Court House, and Cold Harbor. In August he received instructions from Grant to drive the Confederates out of the Shenandoah Valley and to lay the valley waste so that the Confederate troops could no longer draw supplies from it, much less maintain their horses and men while passing through it. Although acting under Grant's express orders, Sheridan has been much criticized for the thoroughness with which he did his wasteful work. Every food animal that his soldiers could find was destroyed. Buildings were spared sometimes, but grain, poultry, and every vestige of food was either consumed, taken away, or destroyed. The inhabitants of this peaceful, fertile valley, many of whom had taken no part whatever in the war, were reduced to the verge of starvation or were ruined financially for life.

Sheridan was an exceedingly active commander. At the close of the war, he held command on the Rio Grande, in New Orleans, and in Missouri. He opposed President Johnson's reconstruction plans, but was a favorite of Grant. On the latter's election to the presidency, Sheridan became lieutenant-general. During the Franco-Prussian War of 1870-1, he accompanied the German army for purposes of observation. In 1883 he succeeded Sherman as commander-in-chief of the army. Sheridan was a student of maps and a maker of maps. Comrades said of him that his knowledge of localities surpassed that of any other soldier in the Civil War.

Sheridan was a short, stout, gruff, kindly man, a devout Catholic. His men had the utmost confidence in his courage and ability, and called him "Little Phil." The popular judgment of Sheridan is well expressed in *Sheridan's Ride,* a stirring poem by T. B. Read.

In 1908 a statue was unveiled in Sheridan Square, Washington. The treatment of the subject is in line with Read's poem. The statue represents the general on his famous black horse, Rienzi, meeting his men in flight from Cedar Creek.

Sheridan, Richard Brinsley (1751-1816), an English playwriter of note. He was born in Dublin and died in London. He came of a family known for generations as speakers and actors. He was educated for the law, but gave it up for literature. He became a theater manager in London and wrote several noted plays, the best of which are *The Rivals* and *The School for Scandal.* The latter is recommended to readers desiring a passing acquaintance with Sheridan. Later in life he entered Parliament, where he distinguished himself as a brilliant speaker. He was associated with Burke in the impeachment of Warren Hastings. He rose to be secretary of the treasury. See DRAMA; THEATRE; BURKE, EDMUND.

Sheridan, Wyo., the third city of the state and the county seat of Sheridan County, is in the north central part of the state on the Chicago, Burlington & Quincy Railroad. The city is important as the shipping point for an extensive grain growing and stock raising center; small quantities of bituminous coal are mined in the vicinity.

Sheridan was settled in 1882, but the site of the city was used as a camping place by Crook's army at the time of the Custer massacre. In 1920 the population was 9,175.

Sheriff, in the United States. a court officer usually elected by a popular vote. His proncipal duties are to preserve peace and order throughout the county, to attend court, summon juries, serve the processes of the court and execute its judgments, to

guard prisoners and produce them when called upon, arrest offenders, etc. The sheriff is authorized to appoint one or more deputies. The authority of the sheriff is greater in England than in America.

Sherman, Texas, the county seat of Grayson County, is 64 miles north of Dallas and 15 miles south of Red River, on the Texas & Pacific, Missouri, Kansas & Texas, St. Louis Southwestern, Houston & Texas, Central and Missouri, Oklahoma & Gulf railroads. Flour, cotton goods, soap, cotton seed cooking compounds, fertilizer, overalls, patent medicines, bricks, foundry products and tobacco products are the principal manufactures. The city is a shipping center for grain and live stock.

Sherman is the seat of the North Texas Female College, Austin College, St. Joseph's Academy, Carr-Burdette College and Kidd-Key Conservatory of Music. The city has a Carnegie library and several attractive parks, among which are Birge and Fielder. Population, 1920, 15,031.

Sherman, John (1823-1900), an American statesman. He was born at Lancaster, Ohio, and died in Washington, D. C. He was admitted to the bar in 1844 when only twenty-one years of age. He entered public life as a Whig. He was elected to the national House of Representatives in 1855 and served until 1861, when he was elected United States senator. In 1877 he was appointed secretary of the treasury by President Hayes. In 1880 he was one of the leading three candidates for the Republican nomination for president. Later he was again elected to the Senate. On McKinley's elevation to the presidency he appointed Sherman secretary of state. He served in this position only a short time, being obliged to resign in 1898 on account of failing health.

Sherman from the first took a prominent part in the deliberations of Congress. He earnestly advocated a vigorous prosecution of the Civil War and supported all measures looking to that end. He was especially prominent in connection with the financial legislation of that trying time and did much later towards the reëstablishment of the national credit and the resumption of specie payments. His name has been connected with an act for the purchase of silver although it was a compromise measure and did not embody his views fully. Under the Sherman Act (1890) the secretary of the treasury was authorized to purchase silver to the amount of 4,500,000 ounces a month, issuing treasury notes in payment therefor. Owing to the increased production of silver to which the law acted as a spur, this legislation in the end proved disastrous. Its repeal and the adoption of a gold standard of national currency is believed by many to have averted financial disaster and a depreciated currency. More recently when the Sherman law is spoken of the Sherman anti-trust act is meant. This law remained on the statute books until a number of years after Sherman's death without being appealed to. It was not until Roosevelt became president and began his crusade against predatory wealth that the country came to realize how effective an instrument it could be made to curb and to punish the unlawful operations of trusts and combines.

Sherman, William Tecumseh (1820-1891), an American general. He was born at Lancaster, Ohio, February 8, 1820, and died at New York, February 14, 1891. He was graduated at West Point in 1840 and gained his first military experience in the Seminole War. During the Mexican War he took part in an expedition to California. In 1853 he resigned from the army to accept a position in a bank in San Francisco. Later he was principal of a military academy at Alexandria, Louisiana. At the outbreak of the Civil War he reëntered the Union Army as a colonel. He commanded a brigade at Bull Run. In the following July he was made a major-general of volunteers. He took part in the capture of Vicksburg, and was in the battle of Chattanooga. When Grant took command of the army in 1864 he placed Sherman in charge of operations in the West. Sherman outmaneuvered General Joseph E. Johnston's army at Dalton and Resaca and forced him back into Atlanta by a series of flanking movements and engagements that have been praised highly by military critics. After President Davis had replaced Johnston by Hood, Sherman defeated the latter in three severe battles near Atlanta and took the city. He then left Thomas

to reckon with Hood and started from Atlanta on his famous march to the sea. He started November 12th, and reached Savannah at Christmas time. His army cut loose from its base of supplies and subsisted entirely on the country. A belt sixty miles in width, greatly relied upon by the Confederates for meat and meal, was swept bare. No doubt Sherman's march did much to cripple the Confederacy, but it is to be regretted that he deemed it a military necessity to destroy the homes and property of thousands of people, especially at a period so near the end of the war. In 1866 General Sherman was promoted to be lieutenant-general. He succeeded Grant as commander-in-chief in 1869. Sherman held the respect of his soldiers, who dubbed him "old Tecumseh." He retired from the army in 1883. He used the first year of his leisure to write *Memoirs of William T. Sherman by Himself*. General Sherman was a brother of Senator John Sherman of Ohio, President Hayes' secretary of the treasury.

Sherry, a strong white wine from the south of Spain. The name is a corruption of Xeres the chief town of shipment. See WINE.

Sherwood. See ROBIN HOOD.

Shetland, a group of islands north of Scotland. The Shetlands lie about fifty miles northeast of the Orkneys. There are about one hundred islands, with a total area of 566 square miles. They are for the greater part hilly and rocky. The inhabitants speak English, but they are largely of Norwegian descent. They are occupied chiefly in fishing. The soil is too rocky and the summers are too rainy and cool to mature crops with any certainty. Much of the surface is covered by peat bogs. Oats, barley, potatoes, and other vegetables are raised to some extent. Sheep, cattle, and horses pasture on the moors. The islands are celebrated for the small breed of horses known as Shetland ponies. The "shelties," as the ponies are called, are a stout, hardy race. There are small manufactures of woolen cloth. The chief exports are herrings, fish, oil, cattle, ponies, eggs, and gloves. The scene of Scott's *The Pirate* is laid on the main island of Zetland or Shetland. See SCOTLAND.

Shield, shēld, a framework carried by warriors to protect the body. Shields of one sort or another appear to have been used from the earliest times. Homer describes the Trojan Hector as carrying a shield of black bull's hide so large that the outer circle struck his neck and ankles. The shield of antiquity was constructed usually of the heaviest rawhide strapped on a wooden frame and provided with one or more handles, enabling it to be held on one arm. Sometimes the shields were of wood. Frequently they were strengthened with studs and strips of metal. The Grecian Hoplites of the *Anabasis* carried small shields. The Assyrian shield was round, convex, and pointed at the center. The shield of the Egyptian spearsmen was made of bull's hide with the hair outward, strengthened around the rim with a strip of metal. It was rectangular in shape, with a semi-circular extension at the top designed to protect the face, and pierced by a small hole through which to look forward. The shields of the Etruscans and early Romans were convex and circular in shape. Later, the soldiers of the Roman legion carried an oblong, rectangular shield, little wider than the body. The column of Trajan shows shields of this sort, as well as an oval shield which came into fashion at a later date. The Franks, with whom the Romans came into contact, carried small round shields made of hides. The early Scandinavians, Vikings, and Anglo-Saxons carried small round or oval shields strengthened with metal and ornamented frequently with elaborate devices. The Normans, who settled in the valley of the Seine and later invaded England, carried large shields provided with an arm strap and handle. They also were adorned with various badges and devices. As shown in the Bayeaux tapestry, the Norman shield was kite-shaped. The Saxons carried round shields. Shields disappeared from the effigies and monuments of England about 1375. The Highland swordsman clung to the use of the bull's hide target. The Highland followers of Prince Charlie carried shields at the battle of Prestonpans in 1745, the last engagement, so far as known, in which Europeans used shields of any sort. To the skilled antiquarian, the shape

and workmanship of a shield is a certain clew to the nationality and period of the warrior who carried it. With the invention of gunpowder and the use of guns in war, shields became useless. They are pictured now only in connection with coats of arms in a heraldic office. See ARMOR.

Shillaber, Benjamin Penhallow. See PARTINGTON, MRS.

Shilling, an English silver coin. It is the twentieth part of a pound. One shilling is equivalent to twelve pence. The equivalent in United States currency is about twenty-four and one-third cents. A shilling of varying value was in use among the Anglo-Saxons. The first English shillings of exact value were coined by Henry VII. They weighed 144 grains. The present English shilling weighs a trifle over eighty-seven grains. The first colonial shillings were coined in Boston. The first struck were mere circular silver blanks having New England on one side near the border, and XII, to indicate twelve pence, on the reverse. They are known as the New England shilling. They were followed by the willow-tree, oak-tree, and pine-tree shillings. Their weight was twenty-two grains. Specimens are now rare and fetch a high price from collectors of old coins.

Shiloh, in sacred geography, a town of Ephraim, Palestine, situated about nineteen miles northeast of Jerusalem. It lay in a plain and was a convenient meeting place for Israel. The ark of the covenant rested in a sanctuary here before Jerusalem was made the capital. Shiloh may therefore be regarded as the capital of Israel for a time. The name has been given to a locality on the Tennessee River eighty-eight miles east of Memphis.

Shingles, the term applied to wooden tiles, or thin pieces of wood, preferably cedar, having parallel sides and thicker at one end than at the other, used like slate or tiling in covering the roof or sides of a house. In the United States shingles are usually about 6 inches in width and 18 inches long. They are laid with one-third of their length "to the weather," that is, with 12 inches of cover and 6 inches of lap.

Shingles have been used for roofing purposes from very early times, and oaken shingles were largely used in England in pre-Norman days. An oak-tree found in the interior United States is called the shingle-oak. Shingles are cut or sawed from a block of wood by a shingle machine or shingle-mill. One form of machine used for this purpose is an adaptation of the machine-saw; another splits the shingles from the block by means of a knife, and this is sometimes called a shingle riving-machine.

The annual average production of shingles in the United States is between six and seven billion. In 1919 it was over nine billion. The greatest proportion of this production is manufactured on the north Pacific Coast, west of the Cascade Mountains, in Oregon and Washington. The industry represents a scattering of small mills, many of which operate intermittently, due to the fact that they do not control the raw material which they use, but must depend upon the cedar logger, not only for the supply but for a reasonable price. The cedar logger on the north Pacific Coast is thus in a position at any time to control the production of the shingle mills through a curtailment in supply or an increase in price.

The market for the cedar shingles produced in the Pacific Northwest is represented by the entire United States, and the extent of their distribution is limited in the main by the competition of substitute roofings. In 1919 the production of substitute or patent roofings. In 1919 the production of substitute or patent roofings, such as asbestos shingles, asphalt shingles, etc., was 30,600,000 "squares" of 100 square feet, while the production of red cedar shingles was equivalent to 7,400,000 squares. In 1920-21 the clear grade of red ceder shingles marketed from the state of Washington to a typical point in Nebraska represented a mill price of $2.66 per thousand, a freight cost of $2.27 per thousand, and a retail cost to the consumer of $5.88 per thousand. Shingles are manufactured in Louisiana of cypress; these cost more than cedar shingles, but are of very lasting quality.

Shintoism, a primitive cult of Japan.

It developed out of ancestor worship and did not connect with dogma and moral teaching. It acknowledged a large number of gods, of whom Amateresa, the sun goddess, was chief deity. From her the mikado is said to have descended. The gods generally represented deified human beings. Up to 550 A. D. Shintoism was the acknowledged religion.

Shipworm, a boring mollusk that lives in piling and other timber immersed in salt water. See TEREDO.

Shire, a geographical division common in England, corresponding roughly to the American county. Originally some of the English shires were the territory of the different tribes, petty kingdoms in short. As examples of these Kent, Essex, Surrey, Norfolk, and Suffolk may be named. Others, as Yorkshire, Durham, Cheshire, and Worcester, were the territory of ancient bishoprics. Still others are artificial divisions formed at later times. The earlier shires, after the petty kingdom period, were under the civic, military, or judicial headship of ealdormen or earls.

Shoes. See BOOTS AND SHOES.

Shooting Stars, vanishing sparks like darts of light, seen at frequent intervals on clear, moonless nights. Shooting stars are supposed to be small aerolites, possibly mere grains of dust that are fused and converted into luminous gas on striking our atmosphere. One eminent author has estimated that over 10,000,000 shooting "stars" enter our atmosphere daily. They are most numerous in the morning hours. They fall at all hours, but, of course, those that fall during the daytime cannot be seen. Sometimes a shooting star is as bright as a regular star of the first magnitude. Large ones leave trains of luminous gas behind them, which are sometimes visible for several minutes before they are wafted away by air currents. Attempts have been made to get their ashes, but with no certainty of success. It is assumed that their material is the same as that of meteors which reach the earth. Without doubt, meteors and shooting stars are falling into the sun, adding to its heat. It is estimated that they bring the earth as much heat annually as the sun gives it in about one-tenth of a second. They also add to the mass of the earth, depositing, it is thought, an inch over the entire earth's surface in about 800,000,000 years. Sometimes brilliant displays of shooting stars occur. At such a time many thousands, possibly millions, of points of light enter our atmosphere in a few minutes or hours. Such displays are called meteoric showers. They are most likely to occur about the middle of November or in August. Astronomers say that the shooting stars we meet are of a bluish green tint, with bright trains, while those that overtake the earth are reddish with only feeble light, the difference being due to the speed with which they enter our atmosphere. So far as known, only one meteor has fallen during a meteoric shower. See METEORITES; COMETS.

Short Ballot, the name given in political affairs to a proposed ballot containing only a few names of candidates for election, the reform consisting in making the greater number of offices appointive. The theory underlying the proposed reform is the same as that underlying government by commission, viz: that it is necessary to elect—or select—only the highest officials, giving them the right—or making it their duty—to choose and appoint honest, efficient subordinates, thus disencumbering, and making less expensive of time and money, the elective process. The advocates of the short ballot contend that, if the voter have but five names before him instead of fifty, he will be moved to investigate the five candidates, whereas he would have neither the time nor the inclination to inquire into the records of fifty; they hold that if five honest, capable men are elected to office, the five may be depended upon to select men of like character to fill inferior offices. So far, the short ballot agitation in the United States has contemplated few officials higher than governors of states.

Shorthand, any system of shortened penmanship that enables the writer to keep pace with a speaker. Shorthand was practiced by the Greeks and Romans. Xenophon is said, on slender authority, however, to have taken shorthand notes of the lectures and talks of Socrates. The earliest positive mention of Greek shorthand dates from the second century. The earliest ac-

tual specimens date from the tenth century. They are preserved at Paris and in the British Museum. Shorthand was taught at an early date in the schools of Rome. A Greek servant of Cicero invented a new system of Latin shorthand in which to make notes of his master's letters and orations. The shorthand system of Tiro, this invaluable scribe, continued to be used for several centuries. Scribes were employed by the early Christians to take down the sermons of bishops, the acts of councils, the lives of martyrs, etc. Tiro's notes, as the system was called, were used in France as late as the eleventh century.

Although French, German, Italian, and other modern languages have their shorthand systems, modern shorthand is of English origin. It appears to date from the period of the Reformation. Charles Dickens, the novelist, was an expert stenographer. He won his way in the world by taking parliamentary proceedings and political speeches in shorthand, preparing reports for the press. Over five hundred professed systems have been advanced in England and a large number have appeared in the United States and other English-speaking countries. The most celebrated of these systems is that of an English schoolmaster, Isaac Pitman, published in 1837 under the title of *Stenographic Sound-hand*. It was pub-

See PITMAN; PEPYS.

Shortt, Adam (1859-), a Canadian political scientist, was born at Kilworth, Ontario, and was educated at Queen's University, Kingston, and at the universities of Glasgow and Edinburgh. From 1885 to 1908 Mr. Shortt was a member of the faculty of Queen's University as assistant professor of philosophy, lecturer on political science, and professor of political science. In 1904 he was on the Ontario Railway Taxation Commission, and was appointed Dominion Civil Service Commissioner in 1908. Mr. Shortt served on several Canadian arbitration boards. Mr. Shortt contributed many valuable articles to the press. He is the author of *Imperial Preferential Trade from a Canadian Point of View,* and *Lord Sydenham;* joint author of *Documents Relating to the Constitutional History of Canada, 1759-79;* and joint editor of *Canada and Its Provinces.*

Shoshone Falls, a noted cataract in the Snake River. Height, 210 feet. See SNAKE RIVER.

Shoshoni, a tribe of Western Indians. They are known also as Snake and as Digger Indians. As compared with the Sioux they were a degraded lot, living on berries, roots, reptiles, and insects, and, in part, by hunting and fishing. The Bannocks, Utes, and Comanches were related to the Shoshoni and are included in the term Shoshonean. The name is preserved in the Shoshone Falls of the Snake River. These falls are 1,000 feet wide and 210 feet high.

Shot. See LEAD.

Shreveport, a city in the northwestern part of Louisiana, on the Red River. It is an important trading center, with a large commerce in cotton and lumber. Among the manufactories are cottonseed-oil mills, lumber mills, a glass factory, machine shops, brewery, candy, and ice factories. Shreveport is in the midst of a large cotton district; natural gas and oil are found close by. Alfalfa, cotton, corn, and fruit are raised in the surrounding country. It is the second city in size in the state having in 1920 a population of 43,874.

Shrew, the general name of a family including the smallest quadrupeds known. The shrews resemble mice in general appearance but are not related to them. The shrews are rather smaller, and have pointed muzzles. They have sharp teeth and are related to the moles. Their natural food is insects, rarely seeds or grain. The common shrew of North America was called moon-eater by the Indians, from a legendary belief that the shrew with its little nose attacked the full moon and ate it away by degrees, until, when the old moon was all consumed, a new moon grew in its place. The shrew is active all winter. There are numerous species, both in the New World and in the Old. England has three; the Alps, one. There are thirty-five species between the Mexican border and the Arctic Ocean. Shrews feed at night. A pair of shrews will soon clear a house of cockroaches. Shrews are quarrelsome to a fault, and are noted fighters; hence the term shrewish applied to a quarrelsome person. Of late the word is applied to women only. The adjective shrewd is in better standing.

Flying-lemur.

European mole.

Wood shrew. House shrew. Water shrew.

INSECTIVOROUS ANIMALS.

Shrews are killed by cats, possibly under the supposition that they are mice, but a strong musky odor prevents the cat from eating a shrew. Owls, hawks, weasels, and shrikes make no distinction between a shrew and a mouse.

Shrike, a family of birds comprising about two hundred, chiefly Old World species. Two are found in America. The northern shrike, or butcher-bird, clad in gray, with black wings and tail and white under parts, breeds in the far north and winters southward as far as Virginia. It is about ten inches long and has a stout, hooked, hawk-like bill. Its habit is to sit aloft on a dead branch, watching for grasshoppers, mice, and small birds. It is a special foe of the English sparrow. The shrike is noticeable for a habit of hanging its food till needed on a thorn, in the fork of a twig, or on the barb of a wire fence. The loggerhead shrike with black upper parts is an inch shorter and breeds from the Canadian line southward. Like the preceding species, it combines the habits of a hawk and a flycatcher. It nests in thorny hedges and thickets at the height of one's head or higher.

Shrimp, a small shellfish allied to the lobster, the crab, and the crayfish. Shrimps have two pairs of antennae and five pairs of legs. They fairly swarm along the sandy coasts of western Europe. The London market is supplied with large quantities taken in scoop nets at high tide. Like the lobster, shrimps turn red in boiling water. There are also fresh-water shrimps—tiny creatures closely resembling their larger salt-water relatives. A pailful of water taken from a grassy marsh almost anywhere is pretty certain to contain several transparent, active little fellows so small as barely to be seen with the naked eye. They are untiring in pursuit of still smaller creatures, and unless checked by a wire screen are likely to eat up all small forms of animal life in an aquarium. See CRAYFISH.

Shrove, in England a term meaning the penitential act of confession to a priest. It is used only in compounds. Of these Shrove-tide or time of confession is the season preceding Lent. It is a season of merry-making as well. Shrove-Tuesday is the last Tuesday before Lent, a day of confession. A Shrove-cake was a pancake made for Shrove-tide festivities.

Shuffleboard, or **Shovelboard,** a game played on a smooth floor, as the deck of a ship. Passengers on trans-oceanic steamers while away time by playing the game. Wooden disks are driven from a chalk line by a blow of a crutch-shaped cue toward a diagram of nine numbered squares, and the player whose disks occupy the squares having the highest numbers wins. The game is played also on a flat table with coins for counters. The coin that lies nearest the end of the table without falling off wins.

Shylock, one of the principal characters in Shakespeare's *Merchant of Venice.* He is a Jew who loans Antonio three thousand ducats on condition that, if it is not paid within three months, the forfeit shall be a pound of the debtor's flesh cut off where Shylock shall choose. Antonio is unable to pay the debt, and the Jew is about to take the forfeit, when Portia, representing a young lawyer, saves Antonio's life and defeats the purpose of the Jew by reminding him that his life is lost if he sheds a drop of Christian blood or takes more or less than the pound of flesh which is lawfully his. Various interpretations of the character of Shylock have been presented by critics and more especially by actors. Until the time of Charles Macklin, an English actor of the eighteenth century, the part was of no real importance on the stage, but was made grotesque by tricks and buffoonery. Macklin gave the role the dignity of a tragedy, representing Shylock as a mercenary, revengeful, bloodthirsty, and inhuman wretch. This is perhaps the most natural feeling to one who reads the play for the first time. Edmund Kean in 1814 first played the part in a way to arouse sympathy with Shylock. Since that time, the majority of commentators have come to agree that Shakespeare intended to picture Shylock as "the representative of a wronged and persecuted race."

Siam, sī-ăm′, an independent kingdom situated in southwestern Asia. It lies in that part of the continent, which, from its intermediate position, is called Indo-China. France claims the eastern part of Indo-China; Great Britain claims the west.

Siam retains the territory between them that these two powers have been pleased to leave it. It includes a part of the long Malay peninsula. On a school map Siam seems a small country. In reality it is larger than France, and has a population greater, it is thought, than that of Sweden. From June to November, the Menam River overflows its valley. It is sometimes called the Nile of Siam. The valley of the Nile is famous for wheat; that of Menam for rice. Rice is the chief food of the people. The rice crop is entirely dependent on the annual overflow for its success. Siam has three regions of interest—the uplands and mountains, the river plains, and the city of Bangkok.

The sapphire, ruby, and the topaz, tin, iron, copper and lead, zinc and antimony, are found in the hills and mountains of Siam. Cocoa and other palms are found in the dense jungles. Vast quantities of teak wood are sent down to the river. The work of carrying the timbers out of the jungles is performed by trained elephants who balance the logs on their tusks. Rice, as stated, is the chief crop. Indian corn, sweet potatoes, the mango, pomegranate, guava, pineapple, and black pepper, as well as tobacco and cotton, are produced in considerable quantities. There is really little limit to the future possibilities of Siam in this direction.

The Menam is full of fish. Cormorants, kingfishers, storks, and pelicans take their share. Crocodiles, lizards, tortoises, and green turtles bury their eggs on the shore. Geese and ducks nest in the reeds and swim about on the waters, unless they are pulled under by a hungry crocodile. Rats and mice, squirrels, and porcupines, are the chief gnawing animals. The tiger, the leopard, the bear, the wildcat, and a wild dog, with several species of deer, are found in the forests. The one-horned rhinoceros is common. There are many large serpents, including the python. In the remotest jungles, the largest elephants known may be found. They are not very wild. The natives make a practice of capturing them and training them to work. There are a few white specimens — mere huge albinos—which are regarded by the inhabitants as sacred. They are kept in the temples, none but royalty may ride on one. The reverence paid this animal has gained for Siam the name of the "Land of the White Elephant."

Bangkok is a picturesque city. The number of its inhabitants can only be estimated, but its population is believed to equal that of St. Louis, Boston, or Baltimore. It is built on islands near the mouth of the Menam River. The houses are of light bamboo construction and stand on piles. A large number of temples, with lofty, gilded spires, and palaces surrounded by large gardens, give the city a picturesque appearance. A large part of the population lives in house-boats, which are moored, seven or eight deep, along the shores. The boatmen are engaged in fishing, and in carrying goods up and down the river from the head waters of the Menam to Singapore. They and their families have no other homes.

The people of Siam belong to the yellow race. They are short in stature, averaging but little over five feet. In religion they are followers of Buddha, in whose service there are 14,000 temples and 87,500 priests. Ordinary laborers earn about fifteen cents a day.

The principal exports of the country are rice, teakwood, dried fish, and pepper. Cloth, kerosene, opium, and hardware are the chief imports. There are telegraph lines and a few railroads. Bangkok has two electric street-car lines and electric lights. Siam is a member of the postal union. It costs but five cents to pay the postage on a letter to Bangkok from any postoffice in America. The lowest temperature known at Bangkok is 54° F.; the highest 97°; the mean average for the year is 81°. Frost is unknown.

When the Siamese first came into contact with Europeans, they did not understand what snow and ice were. Two English travelers once told the king that in their country water grew so hard that people could walk and slide on it. He took grave counsel with his wisest advisers, and informed the foreign scientists, at least so the anecdote runs, that the presence of such accomplished liars was not desired in the kingdom of Siam.

A feature of Siamese life of great in-

terest to outsiders is the royal elephant hunt, the greatest hunt in the world. Unless interrupted by other matters, the king, accompanied by his court and a great number of tame elephants, beaters, and hunters, goes up each year to the interior of his country to drive wild elephants. A stockade or kraal has been built at a convenient place near the bank of the Menam River. A great extent of jungle is surrounded by a cordon of elephants and beaters. They advance toward the center, driving the wild elephants before them. As the hunt nears the center, droves of from ten to twenty-five of these immense beasts with their young may be seen fording the streams or threading the jungles, seeking to escape. The kraal is formed of immense timbers set on end after the manner of an American stockade. Openings are left for the elephants to enter. The elephants come plunging wildly through the forest and find themselves in the stockade before they are aware.

STATISTICS. The following are the latest reliable statistics to be had:

Land area, square miles	198,900
Population (1912)	8,266,408
Chief City:	
Bangkok	541,000
Number of districts	409
Members of legislative council	40
National revenue	$30,000,000
Bonded indebtedness	$30,000,000
Rice, tons exported annually	1,100,000
Teakwood, tons exported	71,617
Tin, tons	8,542
Domestic animals:	
Horses and ponies	132,675
Elephants	6,294
Bullocks	2,620,682
Buffaloes	2,508,164
Imports	$61,364 835
Exports	$68,590,850
Miles of railway	1,376
Teachers in public schools	4,351
Pupils enrolled	159,751

Siamese Twins, The (1811-1874), natives of Siam. Eng, "right," and Chang, "left," were connected in their abdominal regions by a ligature several inches long and about two and one-half inches in diameter. The livers of the twins lay close to the extremities of the ligature, and were so connected with veins running from one to the other that surgeons did not dare to cut the twins apart. The band was long enough so that the twins could face each other or stand side by side. In 1829 Eng and Chang were brought to the United States and exhibited as wonders. They differed in size and habits. Chang was intemperate and irritable. Eng was quiet and sober. Under the name of Eng and Chang Bunker they lived at Mt. Airy, North Carolina, for twenty years. They married sisters and had large families of children, many of whom died young, but none were deformed. Chang died first of a paralytic stroke while Eng was asleep. Surgeons were hoping to free Eng and to keep him alive, but he expired in great terror inside of a few hours.

Siberia, a vast region of northern Asia, a possession of Russia. It comprises nearly all Asia north of the fiftieth parallel. It extends from the Ural Mountains to Bering Sea, a zone of territory 3,600 miles in length. The area of Siberia proper is given usually at 4,210,020 square miles. This estimate must be reduced somewhat by the recent cession of the southern half of the island of Sakhalin to Japan. The population in 1920 was returned at 9,257,825. The southern district of Siberia has a general altitude of from 2,000 to 3,000 feet. The entire region slopes northward to sea level.

It is convenient, at least, to divide Siberia into an eastern and a western section separated by the one hundred fifth meridian, or, in other words, by a north and south line passing near the western edge of Lake Baikal. The western section is not unlike eastern Russia. Four belts of soil and climate may be noted. Named from south to north, they are the steppe region, in parts arid and salty and in others adapted to grazing; next a belt of black soil not unsuitable for agricultural purposes; then a zone of birch, fir, and pine forests inhabited by fur-bearing animals; and, lastly, a wide extent of tundra, or mossy, half frozen plains sparsely inhabited by reindeer and other arctic animals. This vast territory is drained into the Arctic Ocean by many streams, including the Obi and the Yenisei, along whose banks a scattered population lives chiefly by hunting, fishing, and trapping. This section is one great plain. The rivers are uninterrupted by cascades. Were it not that the Arctic and the lower courses of the rivers are ice-bound

for ten months in the year, they might afford waterways for ships of great size.

The eastern part of Siberia is the higher and its surface is, on the whole, mountainous. There are valleys capable of cultivation. Those near Lake Baikal are the most fertile in all Siberia, but the eastern section is generally rough and inhospitable. Its mineral wealth and forests are as yet little known.

When first known to the historian Siberia was part of the extensive domain of Genghis Khan. In 1580 a band of Russian Cossacks, who had been accustomed to plunder ships on the Volga, fled from justice and established themselves in Siberia. Later they offered to bring a section of the country under the "protection" of the czar on condition of peace and forgetfulness of the past. The Russian advance from one river to another was rapid. In 1689, a century later, a treaty with Peking allowed the claim of Russia clear to the borders of the Pacific Ocean.

Many political exiles sent to Siberia during the reign of the Czars, were of great assistance in developing the country. The Trans-Siberian Railway, connecting Vladivostok with Moscow and Petrograd, was completed in 1905. For administrative purposes, Siberia is divided into four governments—Irkutsk, Tobolsk, Tomsk and Yeniseisk. When the Bolshevists obtained control of Russia, an All-Russian government under Admiral Kolchak was organized at Omsk, in 1918. Meantime, American and Japanese troops entered the country to preserve order and the Americans intervened to prevent exploitation of the country by Japan. They also repaired the Trans-Siberian Railway and put it in operation. In 1920 Kolchak was overthrown and Soviet government was established. Siberia is now administered as a separate republic.

Sibylline Books. See SIBYLS.

Sibyls, sĭb′ĭlz, in ancient mythology, certain women credited with powers of divination and prophecy. They are popularly reputed to have gone into what now would be called probably an epileptic fit, during which their ravings and mutterings were recorded carefully and changed into Greek hexameter verse. Homer and Herodotus make no mention of any sibyl, while Plato, Aristophanes, and Heraclitus speak of only one. Others mention ten or twelve different sibyls, the Persian, the Libyan, the Delphic, etc. According to Plutarch the sibyl of Delphi was the first. The most celebrated sibyl was the sibyl of Cumae in Italy. According to tradition she appeared before Tarquin the Proud and offered to sell him nine books which she alleged were of importance to the infant Roman nation. On his refusal to buy, she burned three and offered the remaining six at the same price. Being again refused, she burned three more and offered to sell the remaining three at the price asked originally for the nine. Tarquin's curiosity was aroused by this extraordinary behavior. He purchased the books and found that they were filled with directions to the Romans in time of national emergency. The care of the Sibylline Books, as they were now called, was intrusted to a college of fifteen Romans. The college was assisted by two Greek clerks, able to read the language in which the books were written. In time of war or other national peril the Sibylline Books were consulted for guidance. They were kept in the Temple of Jupiter on the Capitoline Hill and shared in its destruction by fire, 83 B. C. A second collection of articles extending to about one thousand verses was made for Rome in Greece, Sicily, Troy, and Africa. This collection was reputed to have been destroyed by the orders of Stilicho about 400 A. D. It was the Cumaean sibyl who conducted Aeneas to the infernal regions, as recounted by Virgil in the sixth book of the Aenead. See ORACLE.

Sicily, sĭs′ĭ-lĭ, an island in the Mediterranean. It lies directly west of the "toe" of Italy. The conformation and organization of the rocks indicate that it is a prolongation of the Apennines of Italy. It is separated from the mainland by the Strait of Messina, which, at its narrowest point, is only a mile in width. While not quite so large as Sardinia, Sicily is the most important island in the Mediterranean. It exceeds Massachusetts slightly in size, also in population. The island has a reputation for fertility. It was one of the sources from which ancient Rome drew a large part of its food supply. The principal productions

are wheat, oranges, citrons, olives, lemons, sulphur, silk, and salt. Sicily is a sunny, picturesque country of rustics and ruins. The markets, puppet shows, lotteries, olives, wines, flowers, goat-herds, water-carriers, green-grocers, street musicians, street bread venders, brigands, and beggars are of untiring interest to the traveler.

Sicily has a peculiar history. Its situation made it a disputed ground between conflicting races and religions. The original inhabitants were no doubt akin to those found on the Italian mainland. The island was colonized by the Greeks, the Carthaginians, and the Romans. Later it was overrun by the Goths and the Saracens. During the eleventh and twelfth centuries it was an independent kingdom under the Normans. It was long a bone of contention between Spain, France, and Germany. During the eighteenth century it was united with Naples under a Bourbon dynasty. The kingdom thus formed was known as the "Two Sicilies." In 1860 the island became a part of the kingdom of Italy. As might be expected, the inhabitants are a mixture of Phoenicians, Greeks, Arabs, Spaniards, French, and Italians. The various elements have fused into a dark-haired, dark-eyed people. They speak a peculiar dialect of the Italian language and are devoted to the Church of Rome.

See DIONYSIUS; ETNA; MAFIA; VENDETTA; SCYLLA AND CHARYBDIS.

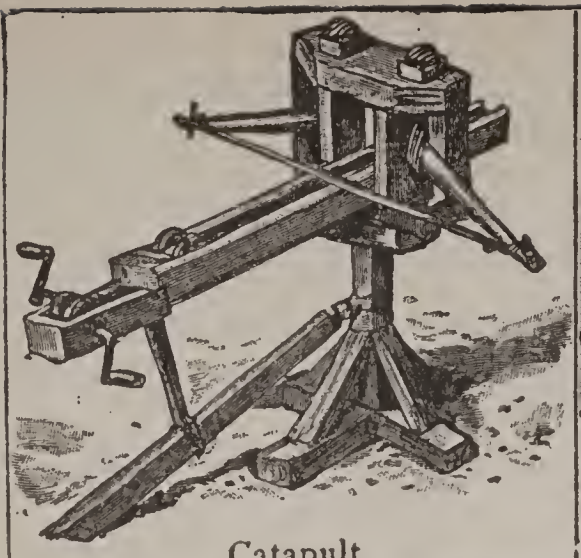
Sickle. See REAPING.

Sickles, Daniel Edgar (1825-1914), an American soldier. He was from time to time student, printer, lawyer, Democratic representative from New York, corporation counsel for the same city, and secretary of legation under President Buchanan. At the opening of the Civil War he raised the Excelsior Brigade of United States Volunteers, and was commissioned colonel of one of its regiments, the 70th New York. He participated in the Peninsula campaign, and in the battle of Antietam under McClellan. In November, 1862, he was made major-general of volunteers, and later bore a distinguished part in the battles of Chancellorsville and Gettysburg. He continued in active service till 1865 and in 1867 was brevetted brigadier-general for bravery at Fredericksburg and major-general for gallant service at Gettysburg. In 1869 he was placed on the retired list of the army. From 1869 to 1873 he was United States minister to Spain and in 1892 he was again elected to Congress. For several years he was president of the New York State Board of Civil Service Commissioners.

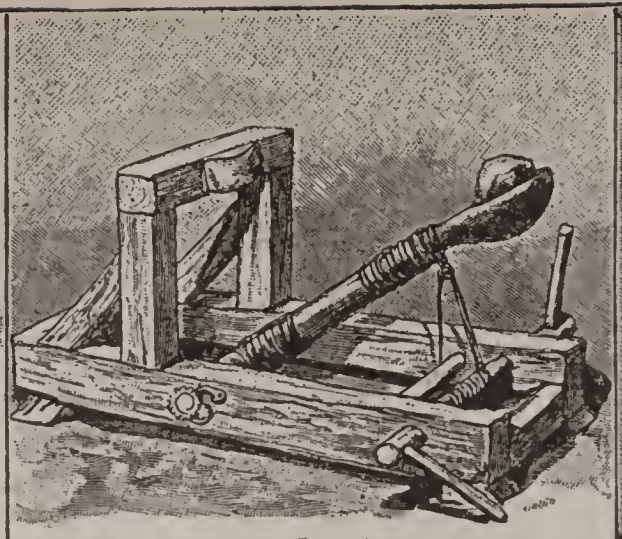
Siddons, Mrs. (1755-1831), a noted English actress. She was born in Wales and died in London. Her maiden name was Sarah Kemble. She was the daughter of Roger Kemble, a theatrical manager. Her husband, William Siddons, was an actor. Her brother John became part owner and the manager of the Covent Garden Theater. She won reputation in London in 1775 as Portia. Her greatest success was as Lady Macbeth. Other favorite roles were Isabella in *The Fatal Marriage,* Jane Shore, Rosamond, Ophelia, Desdemona, Queen Elinor in *King John* and Queen Catherine in *Henry VIII.* Gainsborough painted her portrait for the National Gallery. In 1784 Sir Joshua Reynolds painted her as *The Tragic Muse.* The latter represents her seated in deep thought on a throne surrounded by clouds. Two figures stand behind her, impersonating open and secret violence. In private life she was a stormy, imperious person, feared, rather than held in esteem; but on the stage she commanded tears and storms of applause. A great-granddaughter, Mrs. Scott Siddons, inherited no little part of her talent. See DRAMA; THEATER.

Sidereal Time. See TIME.

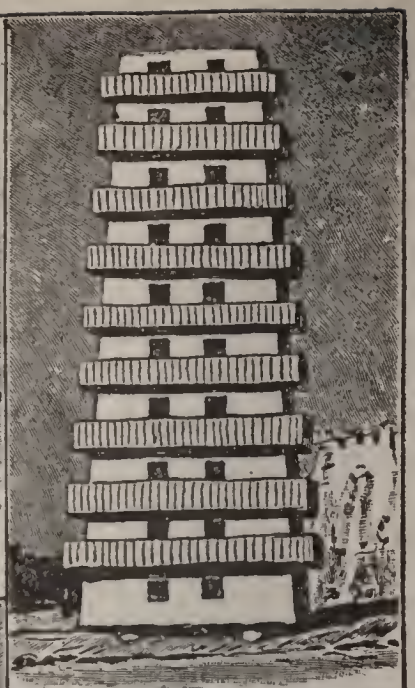
Sidney, sĭd′nĭ, **Sir Philip** (1554-1586), an English courtier, soldier, and writer. He studied at Oxford. At eighteen he obtained permission to go abroad in the train of the English ambassador with a servant and four horses. He was in Paris at the English embassy during the Massacre of St. Bartholomew. Travel in Hungary, Italy, Germany, and Flanders fitted him for diplomacy. On his return he was employed repeatedly on diplomatic missions. He was a man of learning, wit, and courtly bearing. Queen Elizabeth is said to have defeated his election as King of Poland "out of fear that she should lose the jewel of her time." In 1586 he was with his uncle, Dudley, Earl of Leicester, at the battle of



Catapult.



Engine for flinging stones.



A ten-story storming tower.

A testudo.

Battering ram. Operators supported by archers.

Hut for protection of the operators of a ram.

A SIEGE IN THE MIDDLE AGES.

1. A covered bridge to be thrust across the moat. 2. Windlass to move the bridge. 3. Portable blinds for archers. Note slit. 4. An Engine loaded. 5. A similar engine discharged. 6. A large siege engine.

SIEGE MACHINES.

Zutphen in aid of the Dutch against the Spanish. He led a charge of 500 Englishmen against 3,000 Spaniards and fell from a gunshot wound in the thigh. As he was being carried from the field, an attendant handed him a water bottle to quench his thirst. In the act of putting it to his lips he noted a dying soldier gaze longingly at the bottle. Sir Philip immediately passed the water to the poor fellow, saying "Thy necessity is greater than mine." Sidney's body was carried home and buried in state in old St. Paul's Cathedral. Following the example of the queen, the entire court went into mourning for him. His chief writings are *Arcadia,* a pastoral romance in prose and verse, and the *Defense of Poesy,* an exposition of the writer's views of poetry. He is thought to have had an influence on Spenser and on Shakespeare, whom he preceded in point of time. See ARCADIA.

Sidon, sī′don, an ancient commercial city of Phoenicia. It was older than Tyre, but became subject to its rival. See TYRE for an idea of the wealth and the extent of the commerce of these cities.

Siege, the sitting down of a military force before a fortified place and continued offensive operations for the purpose of taking it. To invest a fort is to surround it by a hostile force. The investing force is known as the besieging force. The defenders are the garrison. To raise a siege is to abandon the attempt. Preparations for an expected siege include strengthening the fortifications and laying in a supply of munitions of war and of provisions. In modern warfare hostilities are not begun until the garrison has been summoned to surrender and has declined or neglected to do so. It is considered humane to allow women, children, and non-combatants to depart before hostilities begin.

The cutting off of supplies has ever been considered an important and first step in conducting a siege. In modern sieges the use of explosives bears a prominent part. Heavy artillery is employed to make breaches in the walls, and bursting shells are thrown within the fortifications to dismay and destroy the defenders. Tunnels or mines are led beneath the walls, and heavy charges of dynamite or other powerful explosives are set off. Storming columns yet enter the breaches in the walls, but shells —heavy shells—grape, and shrapnel now take the place largely of surprise and of assaulting forces.

The various sieges of the World War demonstrated that however strong defenses may be, modern artillery can in time batter them down. Moreover, the long range of siege guns—from seven to eight miles—place the investing force out of reach of the garrison. For these and other reasons, contending armies found earth embankments more satisfactory than walls of heavy masonry.

Rome was besieged several times. The Romans are said to have taken sooner or later every walled town they ever laid siege to. The siege of Acre, 1191, belongs to the period of the Crusades. The siege of Rochelle, 1628, is one of the most noted in French history. Others are Metz, 1870; and Paris, 1870-1. British history is full of sieges. Among those of note are Calais, 1347; Orleans, 1428; Taunton, 1644-5; Londonderry, 1689; Gibraltar, 1782-3; Sebastopol, 1854-5; Lucknow, 1857; and Ladysmith, 1900. Constantinople was taken by the Turks in 1453; the Spaniards laid siege to Leyden in 1573-74. "High Belgrade," the frontier of the Danube, witnessed a dozen sieges. Prince Eugene took the city in 1717, and it was again bombarded by the Turks in 1862. Scarce a hill or pass in Europe but had its fortress, and scarce a fortress, however ruined, but has its story of seige and defense. The defense of Port Arthur by the Russians in 1904 established a new era in the history of warfare by siege. In March, 1915, the Russians took Pryzemysl, Galicia, after a spectacular siege of five months. A more romantic and quite as heroic defense was made by a British force at Kut-el-Amara, Mesopotamia, in 1917, when, after 143 days, the English were starved into surrender. American soil is not noted for sieges. Those of Quebec in 1759-60, New Orleans in 1814, Vicksburg in 1863, and Richmond in 1864-5, may be mentioned.

Siegfried. See NIBELUNGENLIED; LITERATURE, SCANDINAVIAN; SAGA.

Siemens, see′menz, **Karl Wilhelm** (1823-1883), a German scientist and inventor. He was a native of Hanover and was edu-

cated at Lübeck, Magdeburg, and Göttingen. Among his inventions are a method of electroplating, a governor for steam engines, a gas furnace for metalworking, the Siemens process of making steel, and improvements in making and laying telegraph lines. He visited England repeatedly to patent his inventions. He finally settled in London, where he died. He was knighted by Queen Victoria for his eminent contributions to industrial science. See STEEL.

Siena, sē-ā′nä, a city of Italy. It is situated about sixty miles south of Florence on the road to Rome. It still retains the massive city walls and architectural features of the Middle Ages. Though now but a city of 30,000 people, dealing chiefly in wheat, wine, olives, and marble, it was formerly a center of culture inferior only to Rome and Florence. The cathedral and town palace are beautiful specimens of the builder's art. A copper bell dating from 1159, the oldest in Europe, hangs in the cathedral. Siena was a cradle of Italian literature, painting, and sculpture. Its tombs, towers, windows, fountains, paintings, statues, and mosaics are the delight of artists. The paintings are noted for brilliant colors and rich costumes. The University of Siena, founded in 1300, is still attended. Annual festivals are held, at which prizes are awarded for skillful horsemanship. The artist's pigment or color known as sienna is a fine clay found in the vicinity. It resembles yellow ocher, but gives a richer, darker, transparent effect. Burnt sienna, or sienna roasted in a furnace, gives a mahogany effect.

Sienkiewicz, syĕn-kye′vĭch, **Henryk** (1846-1916), a Polish novelist. After graduation from the University of Warsaw he contributed a series of critical essays to a Warsaw literary journal and was later the editor of a paper published in that city. He wrote his first novel, *Na Marne,* in 1870. It at once attracted attention and was translated into English and other European languages. A number of other works followed, all of which were favorably received. The work by which he is best known, indeed thought by some his masterpiece, *Quo Vadis,* was published in 1897. The scene is laid in Rome in the time of Nero, who is one of the characters described. One strong chapter of *Quo Vadis* describes the burning of Rome; another a banquet attended by members of Nero's dissolute court. Sienkiewicz borrowed his title from a story told of St. Peter. While fleeing from Rome and his persecutors the Apostle met Christ, so it was said, on the Appian Way, and addressed him with, *"Dominie, quo vadis?"* (Lord, whither goest thou?). "To Rome, to be crucified again," was the reply. Peter, taking the rebuke to himself, turned back to meet the fate and win the crown of a martyr. Sienkiewicz visited the United States in 1876 and remained for some time in California. In 1891 he traveled in South Africa.

Sierra Leone, a British colony. It lies on the West African Coast adjacent to Liberia. Area, 4,000 square miles; population, 80,000. There are less than 1,000 whites. Over half of the population has been converted to Christianity. Over 8,000 pupils are in school. Freetown, the capital, has a population of 34,000 and carries on a thriving export trade in palm oil, ginger, peanuts, kola, and India rubber. The native artisans excel as gold and silversmiths. In 1920 over 1,625,000 postal packets were carried. In 1896, 30,000 square miles of additional territory was annexed under the title of a protectorate. This territory extends 180 miles inland and has a native population of 1,000,000. An active traffic is carried on in forest products.

Sifton, Arthur Lewis (1858-1921), a Canadian statesman, was born at St. Johns, Ontario, and was educated at Wesley College, Winnipeg, and at Victoria University, Cobourg. After removing to the Canadian Northwest, 1875, Mr. Sifton was admitted to the bar, 1883. In 1899 he was elected to the legislature of the Northwest Territries, serving until 1903. Mr. Sifton served as treasurer and as minister of public works for the Territorial supreme court from 1903 to 1905. After the organization of the province of Alberta, he served as chief justice of the supreme court of that province until 1910. After 1910 he was Liberal prime minister of Alberta, as well as treasurer and minister of public works.

Sifton, Sir Clifford (1861-), a Canadian statesman, was born in Middlesex County, Ontario, and was educated at

Victoria University, Coblenz. After being called to the bar, 1882, Sir Clifford practiced in Brandon until 1888, when he was elected to the Manitoba legislature. From 1891 to 1896 he was provincial attorney-general. During the same period he was minister of education, and as such was a consistent and vigorous opponent of the movement to establish separate schools in Manitoba. From 1896 to 1911 Sir Clifford was Minister of the Interior, in the Federal cabinet, and while in this office he formulated the immigration policy of Canada that resulted in a remarkable influx of settlers. He resigned his post in 1911 and strongly opposed the Taft-Fielding reciprocity agreement. For his services to Canada, knighthood was conferred upon him in 1915.

Sigel, sēgĕl, **Franz** (1824-1902), a German-American soldier. He was born at Sinsheim, Baden, and studied at the military school at Carlsruhe. In 1848 he headed a revolution in Baden, and three years later was arrested in Switzerland. Escaping to America, he edited a German military paper in New York, and later in St. Louis. When the Civil War broke out he organized a regiment and joined the Union Army, being commissioned brigadier-general of the volunteers. He served with distinction in the Missouri campaign of 1861. The Union victory of Pea Ridge was due to his timely orders. After this he was made major-general, and given command of Harper's Ferry. He commanded a corps in the Army of Virginia from Cedar Creek to the Second Bull Run in 1862. The following year he was given command of the Western Pennsylvania Reserves, and in 1864 of the Department of West Virginia. After a defeat by Breckenridge with a larger force, he was succeeded by General Hunter, and given charge of the division guarding Harper's Ferry. In July he defended Maryland Heights with 4,000 men against Early's 14,000, but was removed from command. After the war he left the army and was register of New York City from 1871 to 1874. From 1886-89 he was United States pension agent there. He also published a German-American paper.

Sigismund, an emperor of the Holy Roman Empire. He reigned 1410-37. He it was who granted John Huss a safe-conduct to the council of Constance and yet allowed that noted heretic to be burned at the stake. Among the events of Sigismund's life and reign were a defeat at the hands of the Turks, a war with the Hussites in Bohemia, and a struggle with the Hungarians.

Signals, a system of communicating, especially at sea. In 1902 a new international code was adopted superseding all previous ones. Two swallow-tailed pennants are used for the letters A and B. Five triangular pennants of different colors are used for the letters C and G; nineteen other flags readily distinguished are used to complete the alphabet. It is possible to spell out any word or message by displaying these flags in proper order. A very great number of signals have been agreed upon, however. C displayed alone means, "Yes"; D, "No"; A hoisted over B signifies "Abandon your ship at once." One combination asks whether icebergs have been seen; another, whether water can be spared; another indicates a desire to send a message, etc. Other combinations of two and three flags afford several thousand possible signals, any of which may be read by the use of the international code book with which each ship is provided. In the Great War troops on a battle front 250 miles long were moved as a unit. Besides flags, wireless, the telephone, the heliograph, lights, aeroplanes and captive balloons were used to transmit orders.

Sikhs, sēks, a religious sect in British India, worshiping one invisible God. Nanak Shah, the founder of the sect, was a deep thinker and insisted on simplicity of faith, living a life as nearly in accord with his teachings as possible. He died in 1540. The leadership of the people at the time of the Mohammedan persecutions was entrusted to Govind Singh. His followers fought bravely and, due to their valor, they became known as lions, or Singhs. After his death the Sikhs and Mohammedans engaged in continual warfare until 1792 when Runjeet Singh became despot, under the title of Maharajah, of the whole Punjab and adjacent territory. Wars with the British broke

out in the middle of the nineteenth century, but in 1849 the Sikhs were conquered and annexed, and are now loyal subjects of the British Empire. The population has increased until it is now over two million.

Silas Marner. See CROSS, MRS. MARY ANN EVANS.

Silesia, a small state lying on the southern border of Poland, having an area of 15,570 square miles, or about equal to the combined areas of Maryland and Delaware, was formerly the largest province of Prussia. Silesia formerly belonged to Poland, from which it was taken by the Germans about 600 years ago. It contains extensive coal and iron mines and economically was one of the most important states of the German Empire. Under German administration the country was highly developed and it forms one of the most important industrial and agricultural centers of Europe.

When the independence of Poland was acknowledged by the Peace Council, the disposal of Silesia was brought prominently before that body. Poland claimed the state on the grounds that the majority of the population was of Polish descent, and that it was a part of their former kingdom. Germany, on the other hand, claimed that during the six centuries of German occupation Silesia had been thoroughly Germanized; that the industries had been developed by German capital. Moreover, Silesia was one of the most valuable mineral states of the German Republic, and its allotment to Poland would so cripple German industry as to make it exceedingly difficult if not impossible for her to pay the reparations claims.

The claims set forth by both countries seemed valid and the Peace Council decided to settle these by a plebiscite. This was held on March 2, 1921, and 683 out of 1,280 communes voted for union with Germany, while there was a total popular majority of about 200,000 out of 1,000,000 votes in favor of Germany. The Supreme Council was unable to agree on a division of the country in accordance with this plebiscite and referred the matter to the Council of the League of Nations. A special commission was appointed to investigate the conditions arising from the plebiscite and recommend a division of the country. This recommendation was unanimously adopted at the second meeting of the League of Nations. It granted Germany the largest part of Silesia but the portion granted Poland included most of the coal and iron mines. In the main, the decision seemed satisfactory to European countries. But it was highly unsatisfactory to Germany.

After the plebiscite, Poland, under the leadership of Korfanty, the Polish High Commissioner, took armed possession of the cities in the mining section. This enraged Germany, and German forces organized in Silesia proceeded to attack the Poles. Both France and Great Britain interfered and the British assumed control of the country. Korfanty was finally induced to withdraw his forces and peace was restored.

Silhouette, sĭl-o͞o-ĕt′, a profile picture in black. The name is derived from Etienne de Silhouette, a French minister of finance of the eighteenth century, noted for economy. In search of amusement, the French court took to parsimony. Coats and gowns were made in the plainest fashion. Snuffboxes made of plain wood and worth a few sous were substituted for the jeweled articles ordinarily carried. In mock parsimony, even portraits were drawn in profile only—to save the expense of oils needed to paint a face. *A la silhouette* became the phrase in an idle court for the prevailing fashion of mock economy. Silhouette has lingered in connection with profile pictures only. A silhouette may be obtained most readily by allowing a shadow of the face or the object to fall on a wall or sheet of paper. Whittier, it may be remembered, uses the term in *Snow-Bound:*

> The cat's dark silhouette on the wall
> A couchant tiger's seemed to fall.

Silica. See SILICON; QUARTZ; SAND.

Silicon, one of the earthy chemical elements. It is most common in nature in combination with oxygen, with which it forms common sand, or silica, as scientists call it. Next to oxygen silicon is the most common element in nature, and silica, that is to say, sand, is the most common sort of soil. Clay also contains silicon. Quartz is composed of silica. Pure silicon is known

only in the laboratory. A slight admixture of silicon is said to improve brass. Added to copper wire, two pounds to the thousand, it seems to increase its conductivity. Silicon, in varying amounts up to fourteen pounds to the hundred, has been employed for a long time for iron workers to harden or soften, toughen, and strengthen wrought iron. The farmer is interested in silicon. It is the soil element that gives the corn stalk, stems of grasses, and straws of grain the flinty coating that enables such slender tubes to carry heavy loads and stand staunchly in the wind. Silicon is not, however, one of the elements absolutely essential to plant life. It is also found in animal bodies,—in the quill of feathers, as spicules in sponges, and as shields in some protozoa. The hair on one's head is partly silicon. A number of stones, favorites more or less with the jeweler, as opal, agate, amethyst, carnelian, onyx, flint, chalcedony, and rock crystal, are composed chiefly of silicon. The name silicon is derived from *silex,* flint, because flint is made of silicon chiefly.

Silk, the product of the caterpillar of the silkworm moth. For a general idea of the stages in the silkworm's life, see article on INSECTS. The silk moth is a native of northern China, where its culture and the production of silken fabrics was a secret jealously guarded for centuries. It is said that a traveler brought away the first eggs in the hollow joint of a bamboo cane. The young caterpillars can be fed for a short time on lettuce and will thrive fairly well on the leaves of the osage orange, but the natural food of the silkworm is the leaf of the mulberry tree. This tree has been introduced wherever the production of silk has been attempted.

The moth is of a creamy color. The females attach eggs the size of a pinhead to some surface and die soon afterward. The caterpillar is at first one-fourth of an inch in length. As it grows it has to change its skin a number of times. In about eight weeks it attains a length of three inches. At this time two tubes running lengthwise of the creature's body and uniting in a nipple-like spinneret at the mouth are gorged with a viscid substance with which the caterpillar spins a silken thread. It winds this thread around its body to form a cocoon. At first the thread is coarse and rough, for the outside shell, then it grows soft and fine for the inner lining. The finished cocoon in which the worm proposes to rest until ready to emerge as a moth is about the size of a pigeon's egg. It is understood, of course, that the silkworm is a caterpillar not a worm.

Four to five days are spent in winding a cocoon. The silkworm rearer selects and lays aside those he desires to keep to increase his stock. These are placed on a canvas in a darkened room kept at a moderate temperature. In about twenty days the moths appear and stay contentedly on the cloth until they lay their eggs and die. Instead of placing the young caterpillars on the tree, they are kept in trays and are fed mulberry leaves. Whether from nature, or whether long domestication has changed its temper just as taming for generations has changed a wild animal into a stable-loving cow, neither caterpillar nor moth are restless in confinement.

The cocoons intended for silk are plunged into boiling water or heated in an oven to destroy the chrysalis. The hard outside of the cocoon is then removed and the silk is wound or reeled. A primitive method followed by the Asiatics of which all others are imitations is the following: A number of cocoons are placed in lukewarm water and stirred with a twig of several branches until the floating ends of several threads have caught on the twig. These are united with a twist and passed through an eye to a whirling wheel or reel on which they are wound into a skein. The warm water softens the mucilage of the cocoon, but leaves enough on the strands to cause them to cohere in a single thread as they pass through the eye. The reel is far enough from the floating cocoons to allow the thread to harden before it is wound. The threads are so fine as to be almost invisible to an inexperienced eye.

The operator watches his cocoons with care. If one ceases to move on the surface of the water, he knows the strand is broken, and he picks it up instantly and puts it in anew. If a cocoon is unwound, he introduces an end from a new cocoon, so that the thread on the reel may be of uniform size. A cocoon contains from 2,000 to

4,000 yards of silk. Rarely can more than 900 yards be reeled off. The rest is classed as "spun silk," because it can be made suitable for use by spinning. The filaments of from four to twenty cocoons are reeled together according to the size of thread desired. When a sufficient quantity has been wound on the reel, the skein is tied to prevent tangling and is then a hank of the raw silk of commerce. From 300 to 600 cocoons, including the chrysalids, are required to weigh one pound. Three and three-fourths pounds of cocoons yield about one pound of raw silk. When this has been freed from gum, about twelve ounces of pure silk remain. One pound of pure silk may be woven into about twenty yards of dress silk.

Silk from injured cocoons, or from those in which the fiber has for any reason become entangled or broken, was, until about 1857, regarded as a waste product. An Englishman, Samuel Lister, found that it could be spun and put to many useful purposes. This waste silk is worked by the spinners either with the gum in it, when it is called Schappe silk, or else is first scoured. It is then treated by the "breaker," which disentangles the mass and breaks it into short lengths. It may then be carded, combed, and spun. It is very lustrous, and, while not to be compared with the reel silk, is used in the production of many articles. Machine thread, cords, tassels, laces, ties, mufflers, ribbons, and a variety of fabrics for furniture coverings and decorative purposes may be made of spun silk. When the silk has been reeled, it is "thrown," which involves the twisting and doubling processes. This corresponds to spinning in some respects, as it involves the twisting into a thread. Technically speaking, reel silk is not spun.

The silk is next "conditioned," that is, tested for the amount of moisture it contains, etc. It is "scoured," or boiled in soap and water to remove the gum. Silk loses from twenty-six to thirty-two per cent of its weight by this process. Dyeing follows. An interesting part of the dyeing process is what is called "weighting." By "weighting" is meant the loading of the fibers, either in the yarn or in the woven fabric, with iron, tin, or other foreign substance to increase the thickness and weight. Silk fiber will absorb of these substances from 50 to 200 per cent of its own weight. It is said that silk has in rare instances been increased by these methods to nine times its original weight.

The rearing of silkworms and the manufacture of silken products from the "raw" silk form two quite distinct industries. The rearer's work is finished commonly with the completion and sorting of the cocoons. They are sent to the filature for the reeling.

The moth and its young are reared under shelter. The production of silk is entirely possible wherever its food, the mulberry tree, can be raised successfully. One ounce of larvae, numbering usually about 40,000, requires 1,400 pounds of mulberry leaves during the twenty-four days of the larval stage. Of course some of this is wasted in fragments. It is estimated that the larvae actually consume about 772 pounds. This one ounce in the completed cocoons will weigh from 80 to 120 pounds. China, Japan, and the Mediterranean countries of Europe are the chief centers of silk production.

Serious attempts have been made to establish the silkworm in America. James I offered a liberal bounty for the encouragement of silk raising in Virginia. The French Huguenot settlers of South Carolina brought the silkworm with them from France. Efforts were made in Pennsylvania. At the beginning of the Revolutionary War the American colonies were actually exporting 1,000 pounds of silk a year. In the early part of the nineteenth century, efforts were made by Congress to encourage the raising of the mulberry tree and the silkworm, but, as a matter of fact, silk raising does not pay in the United States. Even France finds it more profitable to buy raw silk from China and Japan than to produce it at home.

Perhaps one-third of the eastern silk is of inferior quality. It is worked up on hand looms and does not reach the market. China weaves about 14,000,000 pounds of silk at home yearly. While the United States may be said to raise silk merely as a curiosity, it is the second silk-weaving country in the world. Over 11,000,000 pounds of raw silk are imported annually

and converted into silks, ribbons, thread, and lace. Of dress silks, velvets, plushes, upholstery, tapestry, ribbons, twist, embroidery, wash silks, gloves, laces, veils, and trimmings, the United States now produces over $688,469,022 worth a year. Paterson, New Jersey, is the American center of silk weaving. It has been called the "Lyons of America." In the amount of raw silk worked up into fabrics, France is the third country of the world.

In the fiscal year 1919-1920 the production of raw silk was 37,817,500 pounds. Japan produced 24,300,000 pounds; China, 10,728,500; Italy, 7,330,000; France, 551,000; Asia (central), 1,654,000; and British India, 110,000 pounds. Japan leads the world in the production of raw or cocoon silk and is followed by China. The Great War nearly stopped production in Europe, but it is slowly returning to its normal state. The difficulty of obtaining cotton during the war greatly extended the use of silk and increased its manufacture and price in the United States.

See MULBERRY; LYONS; ST. GALL; RIBBON; SATIN; TAFFETA; GROSGRAIN.

Silliman, Benjamin (1779-1864), an American scientist. He was born at North Stratford, Connecticut. He was graduated at Yale in 1796. He prepared for the bar and was admitted, but in 1802 he accepted the chair of chemistry and natural history in Yale. He went abroad in 1805 and studied at Edinburgh, taking a special interest in geology. On his return he undertook a geological survey of Connecticut. He was for fifty years one of the foremost scientists of the United States. He founded the *American Journal of Science* in 1818, and was named by Congress as one of the charter members of the National Geological Society. He was a man of force, an instructor of ability. He presented the best courses in chemistry and geology offered at that time in America. His son also was an able scientist and succeeded his father in the chair of chemistry at Yale.

Silo, an air tight chamber or structure, either above or below ground, for the storing of green crops, usually cut small and tightly packed, for future use as fodder in the state called ensilage, the result of a process of fermentation. This process is similar to that by which cabbage is converted into sauerkraut, and has been employed in some countries from very early times. The silo is now a conspicuous feature of many American farms. The earliest silos were pits dug in the ground in such a way as to exclude the air as much as possible. Brick-lined chambers were used in more modern practice, often with a movable wooden covering, heavily weighted to press down the contents. But in America the pit silo has largely given way to substantial structures above ground, wood, brick, stone and concrete being the materials used in their construction. The wooden silo was at first of rectangular form, but most silos are now built of cylindrical shape, which gives greater strength and prevents the spoiling of the silage in the corners. Some wooden silos have walls composed of staves bound together with flat or round hoops. Others are walled with studding, lined and sheathed with boards or inside lathed and plastered with cement. Foundations of stone laid in cement are common, and the superstructure is often sunk some distance into the ground. All silos built above ground require doors, which are usually placed one above another for convenient admission of the green fodder, to which a little salt is often added to promote fermentation.

Silurian Period, a geological designation first applied to a series of rocks found in the region once inhabited by the Silures, a people of Iberian origin, who dwelt chiefly in southern Wales. The Silurian system was described by Sir Roderick Murchison in 1839, and the term has been universally adopted. Murchison divided his system into Upper and Lower Silurian, but there is a distinct breach between these two divisions. In America, the Canadian and Trenton formations are thought to be Lower Silurian. In Russia vast acres are covered by Silurian rocks. Algae, corals, bracahiopods, trilobites, and other crustacea, are found, and, in the upper strata,

Silver, a lustrous white metal ten and one-half times as heavy as water. It is not acted on by air, oxygen, or water. The tarnish of silver spoons used with eggs, fruit,

or acquired in a coal-heated house, is derived from a trace of sulphur, for which silver has a strong affinity. As a consequence, silver ores are usually a compound of silver and sulphur with a third metal, as lead, zinc, copper, or arsenic. In fact a percentage of silver is often relied upon for the sole profit in working many lead and copper mines. Sometimes silver occurs free from other metals. It then takes the form usually of cubes or else eight-sided masses, or again the silver may occur in a fibrous mass. One piece of silver in the Copenhagen Museum weighs 500 pounds.

The greatest single silver vein ever known is the famous Comstock lode of Nevada. Since its discovery in 1858, it has yielded over $335,000,000 worth of silver and gold. Virginia City and practically the state of Nevada were built up on the wealth of the Comstock. The vein consists of a belt of quartz several hundred feet wide and about 10,000 feet long descending to unknown depths. Unaccountable heat, bad air, and water render it difficult to work the Comstock lode at the depths to which the miners are now required to go, and production has fallen off from $36,000,000 in 1877 to possibly a present thirtieth of that sum. Montana now leads the Union in production of silver, notably from lead ores in the Leadville district. The Coeur d'Alene mine of Idaho yields a large amount of silver from lead ores. The greater part of the copper ore of Montana yields silver. The latest figures for production for Alaska and the United States proper are given in the following table:

State	Value
Alaska	$ 903,228
Alabama	5
Arizona	5,965,404
California	1,817,256
Colorado	5,674,622
Georgia	4
Idaho	8,088,523
Illinois	9,473
Massachusetts	1,274
Michigan	561,945
Missouri	135,190
Montana	14,566,746
Nevada	8,217,109
New Mexico	768,509
North Carolina	11
Oregon	111,648
Pennsylvania	99
Philippine Islands	24,292
South Carolina	1
South Dakota	96,234
Tennessee	117,790
Texas	574,195
Utah	12,910,615
Washington	195 226
Wyoming	24,292
Total	$60,801,955
Fine ounces	55,361,573

Prior to 1873 silver was readily exchangeable for coin at a fixed price, but about that date the leading countries decided upon gold as a single standard, and silver has since sold like lead and iron at whatever price it could command in the market. The highest price since 1833 was $1.36 per ounce in 1859; lowest, $0.23⅝ in 1915.

See GOLD; PERU; AZTECS.

Silver Age, The. See HESIOD.

Simeon Stylites. See ANCHORITES.

Simile, in rhetoric, a poetic or imaginative comparison in express terms of two things having some striking point or points of resemblance. Thus when Byron says: "The Assyrian came down like a wolf on the fold," he compares the swift, relentless descent of the Assyrian horde on helpless Judea to the attack of a ravening wolf on a flock of defenseless sheep.

Simms, William Gilmore (1806-1870), an American novelist. He was a native of Charleston, South Carolina. He was for a time editor of the *City Gazette,* a Charleston paper opposed to the doctrine of nullification. During the Civil War, he edited a paper which upheld, naturally, the side of the South. He was a frequent contributor to magazines, writing, of course, from a Southern and pro-slavery point of view. The list of his published works contains two or three scores of titles, counting novels, poems, and dramas. He is best known by his Revolutionary tales, including *The Partisan, Mellichampe, Katherine Walton, The Scout, Woodcraft,* and *Eutaw.* Other border tales are *Beauchampe, The Yemassee,* etc. The latter is called by many his ablest work.

Simoom, or **Simoon,** an Arabic name for the dust storms of Africa and Arabia. Under the intense heat of the noonday sun

vast tracts of sand become almost as hot as boiling water, and create atmospheric disturbances not unlike the cyclones of the West. See WIND; CAMEL; SAHARA.

Simplon, a mountain and pass in the Canton Volais, Switzerland. In 1800-06 Napoleon constructed one of the finest roads in the world through this pass. It is 41 miles long, from 20 to 30 feet wide, has numerous tunnels and 611 bridges.

A railroad tunnel 12.4 miles long was completed in 1905 at a cost of $14,000,000. It is the longest tunnel in the world and consists of two tubes, actually making two tunnels. It connects French Switzerland with Milan.

Sims, William Sowden, (1858——), an American naval officer, born at Port Hope, Ontario, and educated at the United States Naval Academy, Annapolis. From 1897 to 1900 he was naval attache to the American embassies at Paris and Petrograd (St. Petersburg). He was inspector of target practice at the Bureau of Navigation during Roosevelt's administration and was instrumental in improving gunnery practice in the American navy. After this he was successively commander of the *Minnesota,* member of the Naval War College and commander of the Atlantic torpedo flotilla. At the outbreak of the Great War, Sims was given command of the American fleet in European waters and made vice-admiral, placing him in equal rank with the commanders of the French and British fleets. The fleet under his charge won the admiration of the world. After the war Admiral Sims severely criticized Secretary of the Navy Daniels for his method of distributing honors in the Navy.

Sinai, sī′nā, or sī′nī, a mountain of Arabia. It rises from the peninsula of Sinai, east of the Gulf of Suez. Properly speaking, Sinai is not a mountain but a mountainous region. There are three principal peaks about 8,000 feet in height. Although the Scriptural account speaks of a single peak, at the foot of which half a million men, with women, children, and cattle encamped for ten months, and on which the law was delivered to Moses, it is impossible to identify the exact locality. Much controversy has been wasted over this point in vain. Mount Sinai is composed of primitive rocks, granite, porphyry, gneiss, etc. The Egyptians found emerald, malachite, turquoise, and copper in this region. It was at one time well wooded, but the granite walls are now chiefly bare. After a heavy rain the deep valleys are filled with rushing torrents, but are soon reduced to dry, sandy channels. A few Bedouins inhabit the region, subsisting chiefly on sheep and goats.

Sinclair, Upton (1878-), an American author and well known advocate of Socialism, was born at Baltimore, Md. After graduation from the College of the City of New York in 1897, he did post-graduate work at Columbia University until 1901. In the latter year, Mr. Sinclair published his first novel *Springtime and Harvest;* but it was not until *The Jungle,* a story of the Chicago stockyards, appeared in 1906, that he came into prominence. The conditions portrayed in this novel led to government inspection of the stockyards and the subsequent improvement of social and economic conditions there. In 1906, Mr. Sinclair founded the Helicon Home Colony at Englewood, N. J., for the purpose of experimenting in cooperative housekeeping. The colony buildings were burned down in 1907, and the experiment was not renewed. Mr. Sinclair assisted in founding the Intercollegiate Socialist Society. A list of his work includes also *The Money Changers, The Metropolis, The Overman, King Coal, King Midas, The Brass Check, Sylvia's Marriage, The Profits of Religion, Sylvia* and *The Goose Step.* Mr. Sinclair is a spectacular reformer.

Singapore, an island at the southern end of the Malay peninsula, from which it is separated by a channel less than a mile in width, called the Old Strait. The island belongs to Great Britain. It has an area of 217,000 square miles. The city of Singapore near the southern extremity of the island is situated on a fine harbor. It is a free port of call, without even a custom house. All Malaysia markets here. Ships from England and India bring the goods of the western world to Singapore; ships from Japan and China bring the goods of the Pacific coast. Enormous quantities of merchandise are loaded and unloaded at the wharves six miles in length. Over fifty lines of steamers from the east and

from the west meet here, like the caravans of old, to exchange cargoes of tin, sugar, pepper, nutmegs, mace, cubebs, sago, tapioca, rice, buffalo hides, rattan, gutta percha, india rubber, copra, tea, coffee, dyestuffs, tobacco, wine, spirits, cloth, opium, fish, coal, petroleum, hardware, cigars, preserved fruits, canned vegetables, and machinery. The export of Singapore is not less than $400,000,000 annually. It is called "The Liverpool of the East." Singapore is headquarters for the menagerie trade in pythons, tigers, pangolins, and other East Indian animals. Population, 423,768.

Singeing, sĭn'jing, in cloth making, the process of removing the nap or fuzz from the surface of textiles by means of heat. If fabrics are to be printed, singeing is a necessity. The cloth to be singed is first brought into contact with brushes which raise the loose nap. The cloth is then passed over and pressed against heavy platinum plates heated to almost white heat by electricity. Great care is taken that the cloth run smoothly, as any delay would result in its destruction. The cloth is passed over the plates so rapidly that about 125 yards are singed in one minute. Gas singeing is another method. In this, the cloth is drawn over a row of smokeless Bunsen gas flames. The process is called "gassing."

Single Tax, in political economy, a tax on land only. The principle was enunciated by Turgot and other French writers known as the school of physiocrats of a century ago. The chief American apostle of the single tax theory was Henry George, an American journalist. His ideas, advocated in the press and on the platform, were put forth in systematic form in *Progress and Poverty,* 1879. The features of the single tax may be summarized:

1. The abolition of all other forms of taxation.

2. The taxation of land irrespective of improvements.

3. The conversion of taxation to a land rent paid the state.

4. The abolition of the assessors and tax gatherers for all forms of personal property, buildings, factories, moneys, and merchandise.

5. The removal of temptation to conceal, undervalue, bribe, and corrupt in connection with assessment of improvements and movable property.

6. The removal of burdens from industry, productivity, and thrift. The exemption of a house from taxation is an encouragement to build one.

7. The removal of the motive to hold more land than is required for a home and tillage, sites of factories, right of way, etc.

8. The consequent availability of land for those who desire to till it.

A few sentences chosen from Mr. George's writing give the gist of his argument:

It would enormously increase the production of wealth:

A. By the removal of the burdens that now weigh upon industry and thrift. If we tax houses, there will be fewer and poorer houses; if we tax machinery, there will be less machinery; if we tax trade, there will be less trade; if we tax capital, there will be less capital; if we tax savings, there will be less savings. All the taxes, therefore, that we would abolish are taxes that repress industry and lessen wealth. But if we tax land values, there will be no less land.

B. On the contrary, the taxation of land values has the effect of making land more easily available by industry, since it makes it more difficult for owners of valuable land, which they themselves do not care to use, to hold it idle for a larger future price. While the abolition of taxes on labor and the products of labor would free the active element of production, the taxing of land values in taxation would free the passive element by destroying speculative land values and preventing the holding out of use of land needed for use. If any one will but look around today and see the unused or but half-used land, the idle labor, the unemployed or poorly employed capital, he will get some idea of how enormous would be the production of wealth were all the forces of production free to engage.

C. The taxation of the processes and products of labor on the one hand, and the insufficient taxation of land values on the other, produces an unjust distribution of wealth which is building up in the hands of a few fortunes more monstrous than the world has ever before seen, while the masses of our people are steadily becoming relatively poorer. These taxes necessarily fall on the poor more heavily than on the rich; by increasing prices, they necessitate larger capital in all businesses, and consequently give an advantage to large capitals; and they give, and in some cases are designed to give, special advantages and monopolies to combinations and trusts. On the other hand, the insufficient taxation of land values enables men to make large fortunes by land speculation and the increase in ground values—fortunes which do not represent any addition by them to the general wealth of the community, but merely the appropriation by some of what the labor of others creates.

This unjust distribution of wealth develops on the one hand a class idle and wasteful, because they are too rich, and on the other hand a class idle and wasteful, because they are too poor—it deprives men of capital and opportunities which would make them more efficient producers. It thus greatly diminishes production.

D. The unjust distribution which is giving us the hundredfold millionaire on the one side, and the tramp and the pauper on the other, generates thieves, gamblers, social parasites of all kinds, and requires large expenditure of money and energy in watchmen, policemen, courts, and prisons, and other means of defense and repression. It kindles a greed of gain and a worship of wealth, and produces a bitter struggle for existence which fosters drunkenness, increases insanity, and causes men whose energies ought to be devoted to honest production to spend their time and strength in cheating and grabbing from each other. Besides the moral loss, all this involves an enormous economic loss which the single tax would save.

E. The taxes we would abolish fall most heavily on the poorer agricultural districts, and thus tend to drive population and wealth from them to the great cities. The tax we would increase would destroy that monopoly of land which is the great cause of that distribution of population which is crowding people too closely together in some places and scattering them too far apart in other places. Families live on top of one another in cities, because of the enormous speculative prices at which vacant lots are held. In the country they are scattered too far apart for social intercourse and convenience, because, instead of each taking what land he can use, every one who can grabs all he can get, in the hope of profiting by the increase of value, and the next man must pass farther on. Thus we have scores of families living under a single roof, and other families living in dugouts on the prairies afar from neighbors—some living too close to each other for moral, mental, or physical health, and others too far separated for the stimulating and refining influences of society. The waste in health, in mental vigor, and in unnecessary transportation results in great economic losses which the single tax would save.

When we tax houses, crops, money, furniture, capital, or wealth in any of its forms, we take from individuals what rightfully belongs to them. We violate the right of property, and in the name of the State commit robbery. But when we tax ground values we take from individuals what does not belong to them, but belongs to the community, and which cannot be left to individuals without the robbery of other individuals.

Sing Sing, the name of a famous prison located at the town of Ossining, Westchester County, New York. It is situated on the Hudson, thirty-two miles above New York City. Its management is humane and progressive and reforms introduced there have been adopted in other prisons, both in this country and abroad. The name of the town of Ossining was also Sing Sing at first, but the unpleasant notoriety attached to the prison resulted in a change of name, made on the initiative of the citizens in 1901. Ossining is, it will be seen, a variant of Sing Sing, both being derived from an Indian word meaning a stony place. The town, which has a population of about 11,500, is built on rocky hills overlooking Tappan Bay and commands a beautiful view of the Hudson River.

Sinn Fein, sin fayen, a society of Irish Nationalists whose purpose it is to make Ireland an independent State. Since 1915 the society has grown rapidly and in 1916 it participated in an armed rebellion in Dublin. The rebellion was quickly suppressed by the British authorities and several leaders were executed. In 1918, the Sinn Fein elected about seventy members to Parliament. Instead of going to London they organized an Irish Republic with a parliament at Dublin.

Sioux, sōō. See DAKOTA.

Sioux City, a commercial city of northwestern Iowa, on the Missouri River at its confluence with the Big Sioux. The residence section of the city is situated on a high bluff overlooking the river valley. Morningside College is located there. The city has fine hospitals and a public library. Twelve parks, two bridges across the Missouri, and a Roman Catholic cathedral are points of interest. There are large manufacturing interests, including flour mills, foundries, machine shops, leather manufactories, three meat-packing plants, two breweries, implement and engine works. There are many large wholesale houses. Sioux City lies in a rich farming country, as an advertisement for which the city once built annual "corn palaces." These were in reality large fairs or exhibits held in unique and beautiful buildings decorated with grains, grasses, and other products of the state. Each fall an "Interstate Fair" is held, when parts of South Dakota, Nebraska, and Minnesota unite with Iowa in the exhibition of farm products, live stock of all kinds, implements and fine arts, and horse races. The population of the city in 1920 was 71,227.

Sioux Falls, a city in southeastern South Dakota, on the Big Sioux River. The falls

of that river furnish great water-power which is turned to manufacturing. Some of the chief manufactories are flour mills, windmill factories, boiler machinery and sheet iron works, wagon and carriage factories. There is also a large meat packing plant. The surrounding country is a rich agricultural district and has large deposits of building stone. Several educational institutions are located there, including Sioux Falls College, All Saints' School, a state school for deaf mutes, and a Lutheran normal school. Other buildings are the state penitentiary, a federal building, a children's home, and a public library. There is a street car system. In 1920 the population was 25,176.

Siphon, a U-shaped tube used for conveying liquids from a higher to a lower level. To use the siphon exhaust the air from the tube, which can be done by sucking it out or filling the tube with water; invert the tube and place one end in the vessel to be emptied. The atmospheric pressure on the surface of the liquid will force it to the highest point in the siphon and it will flow out through the other arm. The siphon cannot raise water higher than it can be raised with a lifting pump, and it cannot be used with a vessel from which the air is excluded. The principle is sometimes used in aqueducts for carrying water over low elevations.

Sir Charles Grandison. See RICHARDSON.

Sirens, in Greek mythology, young maidens who sat on a certain island or promontory of southwestern Italy and sang songs of such bewitching sweetness that passing sailors, forgetting their duties, were drawn to their destruction on the rocks. According to Homer, Ulysses, voyaging homeward to the faithful Penelope, filled his sailors', that is to say his rowers', ears with wax and lashed himself to a mast where he was powerless to change the course of the ship. In this way he succeeded in getting safely out of reach of the enchantresses. One account has it that, on being resisted for the first time, the sirens flung themselves into the sea, where they still lie, huge, dangerous rocks. In Greek art, the sirens are figured often as having the wings and legs of birds, with the bust and upper parts of maidens. Each is carrying a musical instrument. No doubt the myth of the sirens is akin to the later belief in mermaids and to the German legend of the Lorelei or river-siren of the Rhine. See LORELEI.

Sirius, sĭr′ĭ-ŭs, or the dog-star, the brightest star in the heavens. It is situated in the constellation of Canis Major, or the Great Dog. It has thirteen times the sun's magnitude and 3.24 times the sun's mass, yet, owing to distance, it gives us only 1/7,000,000,000 as much light as the sun. The Egyptians hailed the appearance of Sirius with delight as the forerunner of the flood of the Nile. The Romans regarded Sirius as the cause of the hot or dogdays of summer. In mythology, Sirius is the hunting dog of Orion. The star follows its master through the heavens at a respectful distance. See ORION; CONSTELLATION.

Sirocco, sĭ-rŏk′kō, a hot, oppressive wind of Sicily and southern Italy. At certain seasons, particularly April and September, the sirocco blows from the south. It is no doubt a continuation of the African simoon. The sky grows hazy with reddish dust, and the wind is so depressing that people stay indoors to escape prostration. Three days is the extreme duration of a sirocco. It is a serious scourge to the husbandman. In Egypt this wind is called a Khamsin, meaning fifty, because it blows for fifty days. See WIND.

Sisal, sĭ-säl′, a material out of which ropes and binder-twines are made. Though called sisal grass and sisal hemp, it is neither a grass nor a hemp. It is the fiber of the long, heavy leaves of an agave, the Yucatan century plant. There are two closely related varieties. The world's supply is derived from the Central American region, chiefly from Yucatan. A small supply comes from Hawaii. In quality, sisal ranks next to manila. The United States cordage works consume about $20,000,000 worth of the raw fiber annually. The name is Indian. Though a native of Yucatan, the sisal agave has been introduced into many parts of Mexico. Its cultivation has been attempted in the Bahamas, Florida, several of the West India islands, India, and the west coast of Africa. It is doing well in Hawaii. The Yucatan industry has grown to large proportions. Tramways are laid to

convey the leaves from the fields. The leaves are from three to five feet long and as many inches in width. The first leaves are ready to be cut when the plant is five years old. Four men and a twenty-five horse power machine can clean the fiber from 150,000 leaves in a day. An acre yields from 500 to 1,000 pounds of fiber. Yucatan ships about 15,000,000 bales of sisal a year. The chief enemies of the sisal grower are wild fire and a black beetle. Sisal is heavier than Manila, but only two-thirds as strong. Sisal rope kinks so readily that it is not suitable for hoisting tackle. It rots in salt water; hence it is unfit for marine cordage. See AGAVE.

Sismondi, sĭs-mŏn′dĭ, **Jean Charles** (1773-1842), a Swiss writer of note. He was a native of Geneva. His father was a well-to-do French Huguenot. The Sismondis were driven from Geneva, and the family property confiscated. Young Sismondi resided in England and Italy, and later became one of the coterie of persons attendant on Madame de Staël. He wrote voluminously. A treatise on practical agriculture was his first published work. *Principles of Political Economy Applied to Commerce* appeared in 1803. His *History of the Italian Republics* in sixteen volumes is standard. He prolonged a *History of the French* to thirty-one volumes and left it unfinished. Sismondi was a man of character and affability—a writer of great industry. He overrated the value of his work, but was never arrogant. As a historian he ranks with Rollin.

Sisters of Charity, an order of unmarried women in the Roman Catholic church. The first congregation was established at Chatillon, France, by St. Vincent de Paul, in 1629. Under authority of the church its houses are to be found all over the world. The sisters are devoted to the care of foundling and destitute children, aged persons, and sick people. They support a large number of hospitals and are noted as nurses. The sisters of charity are well known for their kindly acts and unselfishness, and are regarded with respect. A number of smaller orders have been founded under the same name and have branches in America. An American order of sisters of charity was founded in Maryland in 1804, but the public understands little of the distinction between different congregations of the name. The tendency of late has been to unite the several orders.

Sistine Madonna, a famous painting of the Christ mother and child by Raphael. See RAPHAEL; MADONNA; DRESDEN.

Sitka. See ALASKA.

Sitting Bull. See DAKOTA.

Six Nations. See INDIANS.

Skald, or **Scald,** an ancient Scandinavian poet. The skald composed songs and poems, and on public occasions sang and recited them. While the skald corresponded in some measure to the bard of the Britons, the word designates specifically those poets whose art required a learned education; that is, a thorough knowledge of the construction of verse. The chief aim of the skald was to celebrate the deeds of some living prince or warrior. A skillful skald was therefore in demand and was well rewarded for his labor. Few complete skaldic poems have been preserved. Many fragments, however, are extant. Some of them are to be found in the *Younger Edda* and others in the sagas. See SAGA; EDDA.

Skate, a group of sea fishes. There are many species. The American skates are related closely to the rays of Europe, one of which, the devilfish of the Mediterranean, attains an extreme weight of 1,000 pounds. Various rays are offered in the fish markets of London, Paris, and other European cities. The American skates, known severally as the common skate, tobacco box, big skate, and barndoor skate, are not favorites with fishermen. The skate is a broad, flat, leathery fish. The pectoral or breast fins are enormously extended, giving the body a rhomboidal shape. The barndoor skate attains a width of four feet and a length of seven feet. It moves like a shadow over the sea floor, flapping its sides slowly. The mouth, eyes, and gills are on the under surface. The mouth is wide and devouring. The skate is devoted to the newly moulted or soft-shelled lobster. The manner in which the skate captures the lobster is both curious and interesting. The skate lies motionless, scarcely distinguishable from the bottom on which it rests, being exactly of the same gray color. The lobster, crawling out from the thicket

of seaweed, may happen to pass near the skate, which instantly lifts one of its broad lateral fins, the white underside of which attracts the lobster, which perhaps mistakes it for food. When once within reach the huge mouth engulfs the shellfish and the process is soon over. For this reason, it is detested by the Nova Scotian fisherman. According to Consul General Kehl, he has begun to take his revenge in a discovery that the unsightly and ravenous skates can be turned to better use than a mere fertilizer. They furnish an excellent kind of glue stock, and their bodies, being largely composed of cartilage, readily dissolve, under the proper treatment, for manufacturing purposes. This new use for the skate, the most destructive enemy of young lobsters yet discovered, will serve two valuable ends —reduce the pest to a cash basis, and save the valuable lobster for table use.

Skates, a pair of steel runners affixed to the feet to enable the wearer to glide swiftly on ice. Manifestly skates are of northern origin. The first were no doubt a pair of bones bound to the feet. Wooden skates came with the invention of tools, and steel skates last of all. As to antiquity, skates are mentioned in the Scandinavian *Edda.* Holland has long been noted for skating. In winter market women skim along the frozen canals carrying produce to market in baskets on their heads. Skating became popular in London about the time of the restoration of the Stuarts. Pepys, writing in his diary December 1, 1662, says: "To my Lord Sandwich's, to Mr. Moore; and then over the Parke, where I first in my life, it being a great frost, did see people sliding with their *skeates,* which is a very pretty art." The American Indians were unfamiliar with skates. The modern club-skate, a favorite with American boys, is little longer than the shoe. The frame is of metal and is clamped to the foot by a single turn of a lever. The fastest records are American. Some of these made from a standing start, no rear wind, are 100 yards, 9⅗ seconds; 600 yards, 55¼ seconds; 1 mile, 2 minutes 36 seconds; 10 miles, 31 minutes 11⅕ seconds; 100 miles, 7 hours 11 minutes 38⅕ seconds. A running high jump of 3 feet 1¾ inches and a running long jump of 15 feet 2 inches are on record. It may be of interest to skaters to know the army rule for strength of ice: Two inches of clear, dark ice will support marching infantry; four inches, cavalry; six inches, field guns; and eight inches, 1,000 pounds to the square inch.

Skeat, Walter William (1835-1912), a noted British scholar. He was a native of London. He was graduated at Christ's College, Cambridge, in 1858, and was connected with the university in some capacity for nearly half a century. Skeat was a noted student of languages. He edited several early English works and the Gospel of St. Mark in Gothic. His reputation rests chiefly on *An Etymological Dictionary of the English Language* in which he threw light on the origin and relationship of the words in daily use. Skeat tells us, for instance, that the Scotch *bairn,* an Anglo-Saxon word, is related to bear, birth, born, and burden; that *road,* another Anglo-Saxon word, is related to ride, raid, and ready; that ripe is akin to reap; suds to sodden; and wagon to wain, weigh, and weight.

Skeleton, in physiology, the framework of the body. The lower animals, as jellyfishes and worms, have no hard matter in their bodies that can be called a skeleton. Other animals, as the snail, starfish, crayfish, and the whole horde of insects, have a crusty protective outside covering, but it is an inconvenient arrangement. In order to grow, an animal of this sort must either burst its covering and produce a new one, or else, as in case of the snail, enlarge the free end and leave that first occupied.

The chief uses of a skeleton are three:

1. It gives shape and proper stiffness to the body.
2. It protects the delicate organs and the soft parts of the body.
3. Its parts act as levers to which the tendons of the muscles may be attached to produce motion.

The skeleton, or want of one, serves as a basis in the classification of animals. The human skeleton consists of over 200 distinct bones. Two of these, the hyoid to which the root of the tongue and the palate are attached, and the knee-cap, are not joined to any other bones. The human skeleton, being upright, is considered the most highly developed of all.

The following outline is convenient:

I. Head or Skull.
  A. Cranium (8).
    1 frontal.
    2 parietal.
    2 temporal.
    1 occipital.
    1 sphenoid.
    1 ethnoid.
  B. Face (14).
    2 upper jaw.
    2 nasal.
    2 lachrymal.
    2 palate.
    2 turbinated.
    2 malar.
    1 vomer.
    1 lower jaw.

II. Trunk.
  A. Hyoid bone.
  B. Spinal Column (26).
    7 cervical vertebrae.
    12 dorsal vertebrae.
    5 lumbar vertebrae.
    1 sacrum.
    1 coccyx.
  C. Ribs (24).
    14 true ribs.
    6 false ribs.
    4 floating ribs.
  D. Sternum (1).
  E. Hip Bones (2).

III. Limbs.
  A. Arms (32 each).
    a. Upper Arm.
      1 scapula or shoulder-blade.
      1 clavicle or collar bone.
      1 humerus or arm bone.
    b. Fore-arm.
      1 ulna.
      1 radius.
    c. Hand.
      8 wrist bones.
      5 metacarpal bones.
      14 finger bones.
  B. Legs (30 each).
    a. Thigh.
      1 femur.
    b. Lower leg.
      1 patella or knee-cap.
      1 tibia.
      1 fibula.
    c. Foot.
      7 ankle bones.
      5 instep bones.
      14 toe bones.

See Animal; Tortoise; Bone; Orang-utan.

Skelton, John (about 1460-1529), an English poet and scholar. He studied at both Oxford and Cambridge. He was in favor with Henry VII, who appointed him tutor to Henry VIII. Erasmus declared him to be the "light and grace" of British scholars. He took holy orders, and was for twenty-five years rector of Diss in Norfolk, although it was said of him that he was "fitter for the stage than for the pew or pulpit." At the time of his entering the church in 1498 he began to write vernacular poetry in a vein peculiarly his own. Chambers describes it as "a flow of rattling, voluble verse, unrestrained satire, and jocularity, and a profusion of grotesque imagery mixed up with Latin and slang phrases." Skelton's most notable works are *Colin Clout,* a satire on the clergy, and *Why Come Ye Not to Court?* in which he satirizes Cardinal Wolsey. The Cardinal was so enraged at this poem that Skelton was forced to seek the protection of Abbot Islip in the sanctuary at Westminster, where he remained in seclusion until his death. Skelton was made poet laureate by both universities, as well as by the court, a fact to which he often refers in his writings. Using, as he did, the vernacular, Skelton's work was of importance doubtless in fixing the language. He is said to be the author of the oldest and best drinking song in the English language. This song was introduced into Still's play, *Grammer Gurton's Needle.* Skelton possessed a powerful intellect, and was one of the most notable scholars of his day. His language is often coarse, his wit rough, his satire abusive. His verse is irregular and unconventional, although showing now and then some hint of beauty and of power in characterization.

Skeptic. See Theism.

Sketch Book. See Irving, Washington.

Ski, skē, the wooden snowshoe of Scandinavian countries. The genuine ski is formed from a strip of straight-grained, tough wood, about five inches in width and from eight to ten feet in length. This strip is about one or one and one-half inches thick at the center, on which the foot is to rest. It is thinned to about a quarter of an inch at each end. The front end is rounded slightly and turned up like the runner of a sled. The ski is fastened to the foot by a strap which passes through the thick part of the wood and over the toe of the moccasin, thus enabling the wearer to carry the ski on his toe while the heel is free to rise. The wearer of the skis usually

carries an alpenstock to steady himself and to assist in going up ascents. In traveling the skis are shuffled along side by side, or they are held side by side as the owner skates down slopes. With the trusty alpenstock in hand, the fearless expert glides forward, crossing crevasses filled with snow without the slightest hesitation, and sliding down the declivities of mountains with the speed of an avalanche. With the aid of skis the hunter and traveler are able to enter regions otherwise impassable. A pace of from four to ten miles an hour is expected. The governments of northern Europe have, it is said, added skis to the equipment of regiments stationed in snowy districts. The mountaineer postmen of Norway use skis. One carrier, in particular, makes his sixty miles a day, carrying a mailbag. Skis have been introduced into Switzerland by Alpine clubs.

Ski tournaments afford fine winter sport. Long distance runs are made over the same course from year to year. Attempts are made each winter to lower the record. These runs are made usually by ski clubs. Usually the day's run ends at some tavern noted for good cheer. The long distance record for Norway is 140 miles in twenty-two hours, rests included. A hilly cañon of great difficulty, near Christiania, thirty-two miles in length, has been covered in five hours. The greatest ski tournament in the world is held yearly at Christiania, Norway. The long jump is the chief feature. The meet is held on a hill three miles from the city. About 100 expert ski jumpers take part. The runner comes swiftly down an incline of about 400 feet and makes a prodigious leap into midair from the raised platform or ledge. The jumper is required to land on his feet and proceed on his way without falling or else he cannot claim a record.

Of late the ski has gained favor in Switzerland. It has been introduced in the United States, particularly in the northern parts of Michigan, Wisconsin, and Minnesota. Red Wing, Duluth, Ishpeming, Eau Claire, Chippewa Falls, and Coleraine are centers of the sport. There are a large number of local associations, and a general midwinter meet at which the local clubs compete for the championship. There are ski clubs also in the Rocky Mountains and in Canada. Among American records for a long jump are: Harry Hall, 1921, 229 feet, at Revelstoke, B. C. The previous record was by Anders Haugen, Dillon, Colo., 214 feet, 1920. At the Revelstoke meet Henry Hansen jumped 221½ feet and Nels Nelson, of Revelstoke, beat his own world's amateur record of 185 feet by jumping 201 feet.

A pair of boy's skis should be made of strips about one inch in thickness at the middle, five inches in width, and from four to five feet in length. The front may be turned up by steaming the points over boiling water for an hour or two. The wood may then be curled into any desired shape and tied in position until it has dried.

See SNOWSHOE.

Skin, in physiology, the outer covering of the body. The skin varies in thickness from an eighth of an inch in the palm of the hand and on the sole of the foot to possibly the one-hundredth part of an inch in other places. The skin of a fair-sized adult is about two yards in area. The mucous membrane, or lining of the interior passages, is a continuation of the skin.

The skin consists of two layers, an outer and an inner. The outer skin is known as the epidermis or cuticle. The outer cells of the cuticle are scaly. They are most numerous on the palm of the hand and the sole of the foot where protection is most needed. The inner part of the cuticle contains the pigment that gives color to the complexion and forms one of the distinguishing marks of races. The epidermis of the hand is raised in parallel ridges arranged in patterns. As these patterns remain the same for life they serve for the identification of criminals.

The inner layer of the skin is known as the *dermis cutis,* and true skin. It contains the nerves of touch, the sweat glands, the sebaceous glands from which hair grows, and a system of blood vessels. The office of the outer skin, like the outer bark of a tree, is chiefly protective, and, as in the case of bark, the outer scales—the older cells—are thrown off and are replaced by others. The inner skin or cutis is protective also, but it is the seat, as stated, of essential systems of organs. The prick of a

pin is not felt till the dermis is reached.

See HAIR; THORN; PERSPIRATION; ALBINOS; LEATHER.

Skink, in zoölogy, a name attached to several species of lizards, mostly of warm countries. They vary considerably. Some have well formed legs and smooth scales, while in others the legs are reduced to mere rudiments.

Skinner, Otis (1858-), an American actor who has no equal in the portrayal of romantic roles. He was born at Cambridge, Mass., and made his first professional appearance at Philadelphia in 1877, as Jim in *Woodleigh.* Two years later, Mr. Skinner made his first New York appearance in *Kiralfy's Enchantment.* He soon became popular for the blending in his work of humor, youthful spirit and sentiment. In his work with Lawrence Barrett, Edwin Booth and Augustin Daly, Mr. Skinner acquired a large fund of knowledge on dramatists and the drama. From 1892 to 1895 he was leading man with Madame Modjeska. Among the later plays in which he won praise are *Kismet, A Celebrated Case, Mister Antonio, Pietro, The Honor of the Family.*

Skua, an Arctic gull. The word is Norwegian, allied possibly to scout. The common or great skua attains the length of two feet.

Skull, in animal physiology, the bony or cartilaginous framework of the head. It contains the brain and supports the face parts. All vertebrates, save the lancelets, have skulls. No animal without a backbone has a skull. The word skull means bowl, or cup. The skull is divided into the skull proper, known as the cranium or brain-box, and the facial region or face. For the eight bones of the cranium and the fourteen of the face the reader is referred to the article on SKELETON. In all mammals, that is to say, animals which suckle their young, the skull is composed of bones corresponding to those of the human skull, but the skull takes many shapes. In mammals other than man the cranium is small in comparison to the facial bones. Birds have a large cranium and small facial bones except that the beak is elongated. There are more bones in the skull of a bird than in that of the mammals. The cranium of the reptile is small and the facial bones large. The skull of the fish shows great diversity. The bones are so changed in shape and number that it is difficult to compare them with the bones of the mammal skull. Formerly the ethnologist or student of the human family based his classification of races on language and complexion, but of late scientists have come to the conclusion that the only safe basis of classification is the shape of the skull. The study and measurement of the skull form a distinct branch of science known as craniometry.

Skunk, a well known member of the weasel family. Skunk is an Indian name. Polecat is French, meaning poultry cat, a very appropriate name, for the animal is a persistent chicken thief. The common American skunk or polecat is about twenty-eight inches long. It is usually black with white stripes running along the sides of the back. The tip of the tail and nape of the neck are also white. The skunk ranges from Hudson Bay to Mexico, seeming to maintain its ground in thickly settled communities. Although a weasel, the skunk resembles the badger and wolverine in appearance. A skunk looking still more like a badger is found in South America. The favorite diet of the skunk consists of squirrels, chipmunks, birds, and young poultry. Eggs, either of birds or of domestic fowls, are its delight. It is a great prowler at night. It has an annoying habit of entering the poultry yard and stealing eggs and even entire broods of chickens and young ducks. It does its work so stealthily and skillfully that the parent bird may be found in the morning sitting on the nest unconscious of her loss.

Three American quadrupeds are noted for sluggishness and apparent stupidity. The first is the opossum, which depends for protection on its ability to feign death. The second is the porcupine, which depends on its quill-covered back and the painful wounds it is able to inflict by striking with its quill-covered tail. The third is the skunk, which is either too indolent or too stupid to seek safety by ordinary means. It relies on an abominably fetid liquid which is stored up in glands near the insertion of the tail, and which it is able to

discharge with a sickening effect upon its enemies, particularly dog and man. The question has been raised whether or not all three, naturally related as they are to some of the most wary, agile, and intelligent of animals, would not have developed a similar quickness and ability to take care of themselves, if they had not been provided by nature with these strange methods of defense.

The fur of the skunk is fine and serviceable. It may be deprived of any fetid odor in various ways. One method is that of trampling the pelts in mahogany sawdust. Skunk farming has become a profitable industry in some of the northern states of the United States and in Canada. Canada had 33 skunk farms in 1920.

Skunk Cabbage, a plant closely allied to the jack-in-the-pulpit, and the calla. In earliest spring a wide fleshy hood, corresponding to the green "pulpit," pushes up three to ten inches in springy places in bogs. These hoods or spathes are spotted with purple, brown, and green, intensifying into red and yellow. They shelter a fleshy globe or cylinder-shaped head of flowers. When bruised, this part of the plant gives off an offensive odor, suggestive of the animal for which it is named. Larger oval leaves one foot in width follow. The fruit ripens in August. It grows from Nova Scotia to North Carolina and west to Minnesota.

Skye, skī. See HEBRIDES.

Skylark. See LARK.

Skyscraper, a type of tall business buildings of recent development. The meaning of the name is self-evident. It was applied first to the tall buildings that have loomed up, one after another, against the sky line in New York City. The year 1869 marks the beginning of the movement. The motive for building skyscrapers is moneymaking. So far as material and labor go, the cost of a ten-story structure is less than the cost of two five-story buildings of the same floor dimensions, while the cost of the ground on which to build is one-half as great. If rooms on the twentieth floor of an office building can be made as safe, as accessible, and as attractive as similar quarters on a third floor; if they can be built for less money; and if they will command an equal, or better yet, a greater rental, owners will build tall buildings. The same statement holds good for stores, hotels, and flats.

The height of earlier buildings was determined by the height to which tenants and customers could be induced to climb. Poverty, and hired help might, indeed, be forced into attics; sometimes attics and upper floors were provided with hoists and were utilized for storerooms; but experience showed that hotel guests, lawyers, clients, shoppers, and homeseekers refused to climb more than four stairways. Five stories was the business limit, and this height could be made profitable only in congested districts. The five-story limit was removed by the introduction of passenger elevators. Once in an elevator the client cares little for an extra story or two. Business men preferred offices on the fifth floor of a building provided with elevator service to offices on a third floor that could be reached only by climbing. Passenger elevators were introduced in the Fifth Avenue Hotel and the Astor House early in the sixties. Competition led to the introduction of elevators in office buildings. The term "elevator building" acquired a decided rental value.

The increasing safety, speed, and comfort of the passenger elevator, together with progress in fireproof construction, led Henry B. Hyde, president of the Equitable Life Insurance Company, to contract for the erection of a seven-story office building on Broadway. This was considered a rash step. The wise shook their heads and prophesied that the upper floors would stand vacant. Mr. Hyde came back by asking double rental for his sixth and seventh floors, and he got it. When tenants found that upper offices were cleaner, airier, lighter, cooler, and quite as accessible, they were ready to pay higher rentals. The *Tribune* followed with a nine-story building, the Western Union with a ten-story building, and the race was on. Other examples of these early, heavy-walled skyscrapers are the Ames in Boston and the Monadnock in Chicago, the latter rising to sixteen stories.

In the meantime, architects were studying ways and means of lightening the load which the walls must carry. To this end, and to save space as well, interior walls and piers of masonry were superseded by less bulky steel construction surrounded by hol-

low tiling. Fireproof construction and the introduction of passenger elevators removed the five-story limit; but for crowded districts, height was still limited by the difficulty of getting room for thick walls. The walls of masonry for a twenty-story building must be thicker than the walls of a five-story building. They need not be four times as massive; but it may be taken as a principle of architecture that the thickness of masonry material, and construction receiving the same, must increase as the height increases. If a proposed building be confined to a narrow lot, there must be a limit to the height of the masonry, lest the interior be reduced to a mere corridor. The escape from this dilemma is intensely interesting. The introduction of steel beams made by the inexpensive Bessemer process enabled architects to build entire interior partitions, floors, stairways, and all, quite independent of the outer wall. The interior became a huge, many-floored, steel-braced, steel cage, capable of standing alone and actually standing on its own part of the foundation. The wall, relieved of the floor burden, was reduced in thickness and became a mere outer wall designed for protection and supporting nothing but its own weight. This "cage" type of construction permitted lighter walls, but still the walls of a high building needed great thickness to support themselves—to prevent toppling.

The crowning step in the evolution of the skyscraper came in an inspiration to get on without the wall at all. As long as the whole interior was a rigid, independent frame, it remained only to devise some way of making it weather-proof; then the wall might go. The Crystal Palace erected in London in 1851, in the main an iron frame set with glass windows, may have given a hint. The skeleton frame of the palace, glass replaced by tiling, may have been a suggestion. The skeleton of the Eiffel Tower of Paris, with panels of tiling, may have suggested the thought, but, anyhow, the idea of "skeleton" construction was hit upon by Mr. Bradford L. Gilbert, the architect of the Tower Building of New York City. He found himself confronted with the problem of erecting a tall office building on a lot twenty-one feet six inches wide. Masonry walls carried to the height desired would have needed to be so thick as to leave scant room inside for elevators, to say nothing of offices to rent. He decided to build a steel frame as in cage construction, to cover the exterior as well as interior columns with tiling, and to fill in the spaces between the exterior beams and columns with tile panels. This was the first skyscraper without walls of masonry. As stated on a bronze tablet on the front of the Tower Building, 50 Broadway, New York, this was "the earliest example of the skeleton construction in which the entire weight of the walls and floors is borne and transmitted to the foundation by a framework of metallic posts and beams."

The modern skyscraper is not a structure of masonry. It is a steel frame building. This first steel building contained only eleven stories, but, by dispensing with walls of masonry, it again raised the limit to which the height of a building may be carried. Numerous skyscrapers of skeleton construction followed. The *Times* Building contains over twenty stories. The height of the new Singer Building, measured from sidewalk to top of construction, is 612 feet 1 inch; the height of the Metropolitan Building, from sidewalk to top of construction, is 700 feet 3 inches. They contain forty-one and fifty stories, respectively. The Woolworth Building is 785 feet high and contains fifty-one stories.

Architects claim there is no limit to the height of skeleton construction. In 1910 the original eleven-story skeleton skyscraper, the Tower Building, standing on a lot little over twenty-one feet in width, was taken down and replaced by a building of thirty-eight stories. See NEW YORK.

Slag, in the reduction of ores, a term applied to the earthy matter that is separated from the metal. Sand and lime, in particular, rise in a molten scum that hardens into glassy masses to which the name slag is applied. The disposition of the enormous amount of slag that forms is one of the problems of the furnace operator. The coarsely pitted lava of volcanoes is called slag by geologists.

Slander, in law, a false tale or report uttered with malicious intent to injure the good name or reputation of another. In other words, slander may be defined as

false, malicious talk about one's neighbor. If reduced to writing, signs, pictures, or print, slander becomes libel. Action at law may be brought for damages inflicted by slander, but slander is not in the eye of the law a criminal offense. In case of libel the sufferer may bring an action to recover damages, and it is also punishable as a crime. Talking to a person to his face, in however unwarranted a fashion, is not considered slander unless a third person be present to hear.

Slate, a sort of flaky rock formed from clay by heat and tremendous pressure in the making. Experiments have demonstrated that if a cube of ordinary clay be squeezed in a press, it will separate into flakes lying parallel to the surface on which pressure is applied. The black color of slate must be attributed to the stain, presumably of iron, and to heat. Slate rocks are found in most mountain regions. The best known slates of this country are quarried in eastern New York, Vermont, Pennsylvania, and other localities of the northern Alleghany region. Ordinary roofing slate is made up of sand, aluminum, iron, potash, magnesia, carbon, and water. Split thin and trimmed to uniform dimensions, slate forms an excellent substitute for shingles. If laid carefully a slate roof lasts practically forever. Blackboards are made from a soft quality of slate free from grit. It is quarried in large sheets, ground by machinery to a smooth surface, then cut by a power saw into squares of the required size. Many substitutes for slate blackboards have been offered. Some of them show an excellent surface to begin with, but all lack durability and prove in the end poor economy. Slate-pencils are made in two ways, either by sawing the pencil out of slabs of the stone, or else by grinding fragments into a powder and molding the pencil in a press. See TALC.

Slater Fund, a gift held by trustees for the education of the negro of the South. The sum of $1,000,000 was placed in the hands of trustees in 1882, by John Fox Slater, a wealthy cotton manufacturer of Norwich, Connecticut, whose father, Thomas Slater, established the earliest cotton mill in the United States, at Pawtucket, Rhode Island. By the terms of the gift the principal is invested. The interest is used in assisting worthy institutions, not in founding new ones. Among the institutions that have received timely aid are the Hampton Normal and Industrial School, and Booker T. Washington's school at Tuskeegee. President D. C. Gilman of Johns Hopkins, Chief Justice Fuller, Mayor Seth Low of New York, and others have served on the board of trustees with fidelity. Over half a million dollars has been disbursed and the fund has grown (1910) to $1,500,000.

Slave, one who is held to labor as the property of another. The slaves of western Europe in the early Middle Ages were chiefly Slavs or Slavonians, hence the term slave. Without doubt slavery originated among savage people in time of war. The lives of captives were spared that they might be forced to drudge for the victors. The institution of slavery outruns the records of antiquity. The Babylonians, the Egyptians, and even the Jews held slaves. The latter people held not only foreign slaves, but made slaves of their own people. Jewish debtors unable to pay, and Jewish thieves unable to make restitution, were sold into slavery. Every fiftieth year, however, the year of Jubilee, Hebrews in slavery were set free.

Slavery was a recognized institution among the Greeks from the days of Homer. The writers, even Plato and Aristotle, assume slavery as a natural condition for inferior races. Labor was performed generally by captives taken in war or purchased from Asia Minor and Thrace. Instances are on record of horrible Spartan massacres of helots to reduce their military strength.

Slavery was common at Rome. At an early day the head of the family might put slaves to death. In the days of the empire legal protection was afforded the slaves. To kill a slave was declared murder. In the sale of slaves families were not to be separated. The number of Roman slaves was very great. As many as 4,000 were held by a single wealthy owner. Many were trained as gladiators.

Upon the introduction of Christianity much was done to mitigate the condition of the slave. The church taught that "God is no respecter of persons and that in His

eyes slave and master are equal." European slavery took the aspect of serfdom, a condition superior to slavery in that the serf was attached to the soil. He was not, indeed, at liberty to go elsewhere; but, on the other hand, his master was not at liberty to sell him to another. As late as the reign of Queen Elizabeth it was deemed necessary to appoint a royal commissioner to inquire into alleged cases of serfdom in England. Except among the Turks, who are considered Asiatic and who still hold slaves and are expressly permitted by the Koran to do so, European serfdom came to an end with its abolition in Russia, March 17, 1861.

It seems strange that slavery—the holding, working, and selling of human beings with no more legal rights than so many cattle—should have had a new growth in America—the boasted land of freedom—after it had died out in other civilized countries. On account of their docility, the negroes of Africa were introduced into the West Indies as early as 1503, eleven years after the discovery of America. The Portuguese were pioneers in the nefarious slave trade, but Christian England turned it to the greatest financial gain. Six hundred and ten thousand negroes were imported in Jamaica alone. Slavery was common in all the colonies prior to the Revolution, but it did not pay in the Northern States. As soon as it had died practically a natural death and financial interests were small, humanity prevailed and slavery was abolished by law. In the Southern States, however, slavery became profitable. Alongside of the system of faithful servants who were treated with kindness in health and cared for in sickness and old age and who were attached to the family and to the family name, arose the terribly tempting evil of raising slaves for sale and the profitable working of plantations of cane and cotton by cheap slave labor. Slavery was abolished in the colonies of Great Britain in 1833. One hundred million dollars was allowed the owners. American slavery was abolished by the Civil War, at an expense that would have paid for the slaves many times over. Even the staunchest advocate of slavery under idyllic conditions would not consent to its restoration.

See SPARTACUS; LIVERPOOL; EMANCIPATION PROCLAMATION; NEGRO; PEONAGE.

Slavs, slävz, a race of people in central, eastern, and southeastern Europe. The Slavs are a distinct race, but are related to the Celts, the Teutons, and to the Greeks and Romans. It is customary to divide the Slavs into two groups, the Russians, Servians, and Bulgarians, and the Poles, Moravians, Bohemians, Wends, etc. In the migration of peoples they may have followed the Teutons westward. They occupied northern Germany as far as Utrecht. Leipsic, Vienna, Lubeck, Magdeburg, and Halle were at one time Slavonic towns. The Teutons or Germans thrice drove the Slavs eastward, though many remained and became subject to the Germans. The dark-haired, dark-eyed people found in parts of Prussia and Saxony are of Slavonic origin. In fact, the original Prussians or Lithuanians were Slavs. About 8 per cent of the inhabitants of Germany still speak a Slavonic language. A much greater proportion has become German, just as Germans in this country become Americans. See RUSSIA; POLAND; MORAVIA; BOHEMIA; JUGO-SLAVIA; CZECHO-SLOVAKIA.

Sled, Sledge, or **Sleigh,** a vehicle without wheels used for dragging burdens on land, or more particularly on snow and ice. It is difficult to distinguish between the three terms. All three are related, doubtless, to slide and slip. In the popular conception a sled and sleigh have runners, while the sledge slides on a single surface. The girl who ties a string to a shingle and gives her doll a ride has a sledge. The first sledge was doubtless a primitive contrivance of this sort, possibly a hollow log drawn by a thong of hide. The pulk or traveling sledge of the Laplander is shaped like a boat. It is pointed in front and square behind. The framework is light and is covered with the hide of a reindeer. The contrivance is about five feet long, a foot deep, and eighteen inches wide. The traveler sits in the bottom of the sledge with his back against the stern and his legs stretched out in front of him. The reindeer, or string of reindeer, is attached by a thong to the pointed end.

The Eskimo sledge is of similar construction. The Eskimo built his frame of bone

or precious bits of floating wood and covered it with the hide of walrus. The English hurdle on which criminals were drawn to execution was a runnerless vehicle with a flat bottom. The farmer's stone boat is a sledge. The toboggan of the northern trapper on which he drags his tent, camp outfit, and traps to the woods and his furs to market is a form of runnerless sledge. The winter vehicle of Russia, though provided with runners, is called a sledge. The traveling sledge of Peter The Great had a body like that of a carriage mounted on a heavy wooden frame having two runners. His traveling trunk was strapped on behind. The streets of St. Petersburg are noted for gay winter turnouts, called sledges.

In the United States and Canada, at least, the bobsled, the cutter, and the handsled are well known. The bobsled consists of two short sleds one following the other. They are connected usually by a reach. The load is carried on a rack which rests on both sleds. The advantage of the bobsled lies in the fact that the two pairs of short runners accommodate themselves to any unevenness in the road better than a single long sled. The American cutter has two runners connected by a slight, well-braced framework, surmounted by a box, provided usually with a single seat and a high curved dashboard in front. It is considered a graceful, comfortable pleasure vehicle. The handsled of two runners is known to every boy in localities fortunate enough to have snow and ice. It is usually six inches in height, with a flat top large enough to seat one person comfortably. Not infrequently two handsleds are joined together like a bobsled with a continuous board on which several persons may enjoy coasting.

The best American timber for the woodwork of sleds is without a doubt that of the hard-shell hickory.

Sleep, a condition of the body in which the nerves rest and cease to carry impressions to the brain or to convey orders. One who is soundly asleep neither sees, hears, tastes, nor feels. If a sensation be violent enough to set the nerves in action, the sleeper is awakened. During sleep, the mind is not conscious. Any action of the body is involuntary. The heart continues to beat, for its action is involuntary—not dependent on the will of the owner. Any circumstance that tends to lessen the sense impressions induces slumber. A slight monotonous circumstance, such as the faint chirp-chirp of a cricket, that attracts the attention and causes the mind to leave other matters and forget its problems, leads to slumber. Cases are on record of prisoners lulling their guards to sleep by some such device. The lullaby song and the slow swing of the cradle act on this principle. Artificial sleep may be caused by certain drugs. The poppy is the plant of sleep. All animals having nervous systems require sleep. Most flesh-eating animals sleep in the daytime and prowl at night. Moths fly abroad at night and rest in the daytime. Man sleeps naturally at night. Those whose occupations require night work testify that sleep in the daytime, even under the most favorable conditions, is not so refreshing. Children require more sleep than adults; fleshy people more than slender people. Outdoor employment and exercise in cold air lead to drowsiness. Adults require to sleep rather less than a third of their time.

Sleeping Sickness, or **Negro Lethargy,** a disease occurring in equatorial Africa, the symptoms of which are sleepiness, torpor and coma. It was known in 1800, at which time it was confined to but a few localities, but it has since become more widespread, owing to travel and better means of communication. Two types of this disease are recognized: The Uganda type, which is violently epidemic, and occurs along the lake shores and water courses; and another, met with in Nyassaland, which is fatal, but not epidemic. Both whites and Negroes are liable to this disease. Its duration varies, the first stage lasting from a few months to a few years, in which life may be prolonged by careful nursing and proper medicines. In Europeans, the duration of the disease is given as from one to seven years. The disease recently appeared in the United States.

Slidell and Mason. See TRENT AFFAIR.

Sling, a well known device for casting stones or other missiles. It consists essentially of a broad bit or palm of leather and two stout thongs or strings, possibly a yard in length, one at each end. The slinger wraps the longer string about his hand for security and holds the other string between the thumb and forefinger. A pebble, leaden bullet, or other similar projectile is then placed in the loop at the middle of the sling. Sometimes a small hole in the leather is made to seat the pebble the more firmly. By whirling the sling over the head and releasing the short string at the proper moment, the missile may be hurled with prodigious force. Slings are of no little antiquity. In I Samuel we read that David prepared for combat with the Philistine giant Goliath by choosing five smooth stones from a brook. When the huge champion advanced, "David put his hand in his bag, and took thence a stone, and slang it, and smote the Philistine in his forehead, that the stone sunk into his forehead; and he fell upon his face to the earth." I Samuel xvii:49. In the time of the Judges there were 700 men of Benjamin able to "sling stones at a hair-breadth and not miss." The Carthaginians and Romans enlisted formidable slingers from the Balearic Isles. The Saxons of the eighth century were expert slingers.

Sloane. See BRITISH MUSEUM; JAMAICA.

Sloe, slō, a European plum tree. It grows from four to ten feet high. It produces rather small plums of a pale blue, covered with bloom. "As black as a sloe," is expressive of dark eyes. On account of its thorns and the toughness of the twigs, the sloe makes an excellent hedge. The sloe-thorn furnishes the fine walking sticks, the redoubtable limber, tough, "blackthorn stick," of which so lively an account is given at Irish fairs. Of late these shillalahs have been so scarce and so difficult to obtain that a fine specimen commands a pound in the London market. The wood of the sloe takes a fine polish, resembling that of the appletree, and is much used for tool handles. The mild fruit has a puckery taste and is of little value. The sloe is considered, however, the ancestor of the common European domestic plum. See PLUM.

Sloth, slōth, an animal of Central and South America related to the armadillo and the anteater. The sloth is so called from the sluggishness of its movements. It is the slowest four-footed animal known. It has rather a clumsy looking body, of the size, possibly, of a raccoon. It is covered with shaggy hair. It has long legs terminating in peculiar feet with the soles turned inward, like the palms of one's hand. The hind foot is armed with four long curved claws; the front foot is armed with three or two, according to the species. The natural home of the sloth is the dense forests of tropical America. It feeds on the leaves and tender shoots of certain trees. It reaches them by climbing out, back downward, on the under side of a limb and hanging on with three legs, while it reaches for food with the fourth. The hair lies long and moss-like. The single young of the sloth is produced in a tree-top and clings to its mother's fur until it is old enough to crawl about and obtain food for itself. The sloth shows considerable activity in getting about a tree-top, and is quite skillful in swinging from the top of one tree to that of another. It descends to the ground with great reluctance. It will strip a tree of every leaf on it, rather than come down. On the ground, the sloth is almost helpless. An early though exaggerated account of the sloth says that it will not travel farther in fifteen days than a man can throw a stone. It manages to shuffle along somehow, walking on its knuckles. Large snakes are the chief enemies of the sloth, against which it is said to defend itself with its strong front claws, and not infrequently to come off victor. In South America there are fossil remains of a gigantic sloth larger than a rhinoceros. It had hands a yard long with which to pull down branches of trees.

Slot Machine, a mechanism which acts automatically, or on pressing a lever, on the insertion of a coin in a slot. Slot machines are attached to public telephones. On the insertion of a coin in the slot the operator is notified by the ringing of a bell that the message has been paid for. In many cities gas is paid for by the insertion of a coin in a slot. When the gas paid for has been consumed it is automatically cut off

and another coin must be inserted. Matches, candies, chewing gum, peanuts, and other small articles can be obtained in public places by inserting a nickel or a penny in the slot machines containing them and pressing a lever. Tunes are played by slot machines. One can be weighed on a scale upon dropping a nickel in the slot. These slot machines are labor savers, accommodate the public, and are useful. Gambling devices worked in the same way have, however, given the slot machine a bad name. Some of these are constructed on much the same principle as a roulette wheel, the insertion of the coin enabling the patron to set the ball in motion. In others, if the coin inserted in the slot drops in just the right place, a compartment is opened from which the fortunate gambler can take his winnings. A common form of slot machine is that carrying three cylinders, each in five sections, and each section bearing the faces of playing cards. A nickel having been dropped in the slot corresponding to the cylinder one wants to play, on pressing a lever a spring is released which sets the cylinders whirling, each section moving independently, to display when coming to rest a hand at poker. These slot machines were at one time in common use in cigar stores, the winnings ranging from one cigar for a pair of jacks to a hundred for a royal flush. Generally, however, purely gambling slot machines are abolished by law.

Slovaks, a portion of the Slavic race, living in former northern Hungary and adjacent parts of Moravia, now included in Czecho-Slovakia. They are related to the Poles, Bohemians, and Moravians.

Sloyd, sloid, a system of training in the use of tools. It is known also as the Swedish system of manual training from its use in Sweden and Finland. The original sloyd consisted in producing a variety of household utensils as dippers, wooden spoons, ladles, knives, etc., by whittling. The system was expanded especially by Otto Solomon (Naas Normal, 1876), to include many other articles and other material, as iron and brass. Drafting was added. In a way the fundamental difference between sloyd and manual training as commonly understood is that which differentiates whittling from carpentry. Doubtless sloyd calls for a more artistic eye and a defter hand.

Slug. See SNAIL.

Smalkald, a small city of Central Germany noted in the Reformation. Present population, about 7,000. It is today surrounded by walls and a moat. Narrow, crooked streets are lined with Gothic houses adorned with lofty gables and rich carving. A monument in the marketplace commemorates Karl Wilhelm, a native of the place, the author of the German war song, *Die Wacht am Rhine* (The Watch on the Rhine). In 1531 the Protestant princes met in an old-fashioned inn called The Crown to form the League of Smalkald against the Catholic emperor, Charles V. The inn still receives guests. Another inn indicated by an inscription and the sign of a Golden Swan is the place where Luther, Melanchthon, and other reformers met in 1537 to draw up the Smalkald Articles, a reaffirmation of the Augsburg Confession. See LUTHER; AUGSBURG.

Small Arms. See GUN; RIFLE; PISTOL; COLT; REVOLVER.

Smallpox, a highly contagious disease. Its nature is not positively known, but there is a strong suspicion among specialists that it is due to the presence of minute animals of the protozoan order. Whatever the exact cause may be, it lurks in filth and clothing for months and years. Smallpox is one of the most widely distributed diseases. It follows man from the equator to the Arctic Circle, and seems to be independent of season, climate, or weather. Smallpox epidemics are just as likely to break out in the city as in the country. The pure air of a mountain top seems to afford no greater security than the slums of a seaboard town.

The course of smallpox is marked by several fairly well defined stages. No signs are noticeable during the first twelve or fourteen days after exposure to contagion. The first symptoms, lasting from two to four days, are a chill, an aching back, and high fever. During the third stage, which lasts about five days, small red spots appear on the forehead, wrists, and hands. These are followed by pimple-like blisters on various parts of the body, and are accompanied by ulcers in the mouth. In about ten days the pustules begin to dry up, leaving small

crater-like pits or pocks, whence the name of the disease. When a number of these pits occur so closely together as to run into each other, they form scars. Smallpox is considered a dangerous disease. About one case out of three or four proves fatal.

Smallpox is related closely to cowpox, and may be merely a more virulent form of that disease. Its origin is unknown. It is believed to have existed in Greece, 430 B. C. The earliest descriptions sufficiently definite to be recognized are those left by Arabic physicians about the end of the ninth century. During the Middle Ages smallpox was prevalent throughout Europe. Its introduction into America dates from 1507, only about fifteen years after the discovery. The world's record of deaths from this disease is appalling. In 1517 Santo Domingo was almost depopulated. In 1520, 3,500,000 deaths occurred in Mexico. In 1770, 3,000,000 people are supposed to have died from smallpox in India. As late as 1856 the disease was epidemic in the villages of Russia, in many cases carrying away four people out of every five. Russian records show that that country lost over 10,000,000 people from this disease between 1800 and 1871.

For some account of a new treatment for this disease, see the article on FINSEN, and for means of prevention, consult article on VACCINATION.

Smelt, a fish somewhat resembling the salmon and the trout. The common smelt of Scotland is from eight to twelve inches in length, and is rather more slender than the trout. The lower jaw projects. The scales are small. The back is whitish, tinged with green; the sides are bluish; the belly, silver. Like the salmon, the smelt is an inhabitant partly of fresh and partly of salt water. It is taken usually at the mouths of rivers. There are numerous species both in the Old World and the New.

Smelting. See IRON.

Smith, Adam (1723-1790), a noted Scottish professor of political economy. He was the son of a customs officer of Fifeshire. He was educated at the universities of Glasgow and Oxford. He held the professorship of moral philosophy at Glasgow for twelve years. He then resigned and traveled in France as tutor to a young nobleman, after which he settled down at Edinburgh to round out his life with study and writing. He lived simply, and was noted for hospitality. His first published work was *The Theory of Moral Sentiments,* an examination of the motives of those who work unselfishly for others. The work on which his fame rests, however, is *The Wealth of Nations,* the first systematic treatise on political economy. It is sufficient to say that Smith advocated free trade and fair play.

Smith, Andrew Jackson (1815-1897), an American soldier. He was born in Bucks County, Pennsylvania. After he was graduated from West Point he served in the Mexican War and also in the Civil War. He was given command of a regiment of California cavalry in 1861, and became chief of cavalry of the Department of the Missouri in 1862. He served at Corinth, Vicksburg, and Mobile, and in 1866 he was made an officer in the regular army. Three years later he resigned and became postmaster at St. Louis, and in 1879 was entered on the retired list of United States army officers.

Smith, Captain John (1579-1632), a noted English adventurer, navigator, and soldier. He was the son of a thrifty farmer in Lincolnshire. While a mere schoolboy he sold his satchel and books, intending to run off to sea, but was delayed by his father's death. His guardian apprenticed him to a Lynn merchant, but finding that it was not his master's intention to send him to sea, Smith bade merchandising farewell. With money obtained from his father's estate he went abroad in 1596 in the retinue of a nobleman bound for Paris. He studied the art of war abroad, and saw service in the civil wars of France and in Holland. Returning to Lincolnshire by way of Scotland, he built himself a booth of boughs and took delight in living like a hermit, spending his time in hunting and in reading books on war. He then set out from home to seek the scene of warfare with the Turks, who were pressing their way up the valley of the Danube. His adventures read more like romance than fact. On his way from Marseilles to Italy, with a company of pilgrims on their way to Rome, he was thrown overboard, Jonah like, for his heresy.

He swam to a little island and was taken off by a passing ship.

Having reached Hungary, Smith distinguished himself as the foremost champion of the Christians. On one occasion, fighting on horseback in the presence of both armies, he killed three Turkish warriors in succession. Finally he was wounded, taken captive, sent to Constantinople, and sold into slavery on the River Don. His master took delight in beating the Christian "dog of a slave." One day, as he was employed flailing grain, the pasha began to beat him anew. Smith slew his master, hid him under the straw, filled a knapsack with grain, jumped on a horse and fled, all in irons, fourteen days to the confines of Russia. By 1605 he was back in England ready for new adventures. He was a member of the company that founded Jamestown, Virginia, in 1607. He was at the head of the colony in 1608-9. The colonists owed it to his energy and skill that they did not perish for want of food. From 1610 to 1617 he was employed in various surveys and explorations along New England to which he gave the name. He was interested in the possibilities of fishing for cod and of bartering for fur. In 1619 he offered his services to the Pilgrims and others, but his religious views did not suit them. They preferred Captain Standish. From this time on, Captain Smith employed his time in writing various works on Virginia, New England, and his travels. He was a vainglorious, energetic, courageous, generous, just man to whom the New World owes much. He lies buried beside Roger Ascham in St. Sepulchre's Church on High Holborn Street, London. His epitaph runs: "Here lies one conquer'd that hath conquer'd kings. Sometime Governour of Virginia and Admirall of New England."

See VIRGINIA; POCAHONTAS.

Smith, Edmund Kirby (1824-1893), an American soldier. He was born in St. Augustine, Florida, was graduated from West Point in 1845, and became a major in the United States Army. He took active part in both the Mexican and the Civil War and was made general in 1864. He participated in the Red River campaign and was engaged at Jenkins' Ferry in April of the same year. He was the last Confederate general to surrender, and at the close of the war he was made president of the Atlantic and Pacific Telegraph Company, president of the Western Military Academy, chancellor of the University of Nashville, and professor of mathematics in the University of the South. He remained in Sewanee, Tennessee, until his death.

Smith, Francis Hopkinson (1838-1915), an American painter and author. He was born in Baltimore, Maryland. He was educated as a mechanical engineer and has planned and supervised the construction of several important buildings. His artistic work is chiefly in water color and charcoal, his sketches of Venice being specially worthy of praise. As an author he is best known for *Colonel Carter of Cartersville.* Other works are *A White Umbrella in Mexico, Gondola Days, The Fortunes of Oliver Horn, Colonel Carter's Christmas,* and *Tom Grogan.*

Smith, Goldwin (1323-1910) an Anglo-Canadian scholar and author. He was born at Reading, Berkshire, and died at Toronto, Canada. He was educated at Eton and at University College, Oxford, and was graduated with honor in 1845. He was admitted to the bar but did not long practice the profession of law. From 1858 to 1866 he was regius professor of modern history at Oxford. During that time he attracted attention first by appreciative lectures on Cromwell which aroused controversy, and later by a vigorous advocacy of the cause of the North in the American Civil War. In 1868 he came to the United States to accept the position of professor of English and constitutional history at Cornell University. In 1871 he went to Canada where he lived until his death in 1910. There he pursued a life of literary activity, editing successively the *Canadian Monthly, The Bystander,* and *The Week,* and constantly contributing volumes, brochures, and pamphlets to the press on subjects, generally controversial, ranging from religion to biography. He was a brilliant, a forceful, and an incisive writer. Among his better known biographies are *Three English Statesmen* (Pym, Cromwell, and Pitt), and *The Moral Crusader, William Lloyd Garrison.* In his will he bequeathed $1,000,000 to Cornell University.

Mr. Smith's views of the relations between the United States and Canada are of interest. He was often called an annexationist by his opponents, but himself repudiated the word as "something humiliating to Canada." Yet his belief remained firm that "continental union in a free and honorable way will come. It will probably not come in the time of anyone as old as I am; but it will come." "No schemes of Imperial Federationists will defeat nature, whose forces draw toward union. Race, language, literature, religion, political institutions, social sentiments, and habits are the same on both sides of the line. . . . It may safely be said that the connection of each of the Canadian provinces with the states to the south of it is stronger than that of the Maritime provinces with Ontario, or of French Quebec, with either. The populations, in short, are rapidly fusing. There will soon be nothing to divide them but a political and fiscal line."

Smith, Hoke (1855-), an American politician and statesman, born in Newton, North Carolina. His father was a New Englander and his mother, whose maiden name was Hoke, was of a well-known southern family. At sixteen he went to Georgia and taught school. He studied law, practiced in Atlanta, Georgia, and in 1887 became owner and editor of the Atlanta *Journal*. As a prominent Georgia Democrat he was able to swing the state delegation in favor of Cleveland as president, during whose second administration he was secretary of the interior. In 1907 he became governor of Georgia and in that office distinguished himself by his devotion to state and national reforms. He convened an extra session of the legislature to secure abolition of the pernicious convict-leasing system.

Smith, Joseph. See MORMONS.

Smith, Samuel Francis (1808-1895), an American cleryman and hymn writer, whose *America,* is popularly, but not legally, the national anthem of the United States. Born at Boston, Mass., he was graduated from Harvard University in 1829, and from Andover Theological Seminary in 1832. In 1834 Dr. Smith was ordained in the Baptist Ministry. He then became pastor of a church at Waterville, Me., and professor of modern languages in Waterville College. In 1842 he was chosen editor of the *Christian Review,* Boston, serving until 1848; and from 1854 to 1869 was editor of the *Publications* of the American Baptist Missionary Union. In connection with the work of the Missionary Union, Dr. Smith made two trips around the world. The hymn *America,* upon which Dr. Smith's fame chiefly rests, was first sung in the Park Street Church, Boston, on July 4, 1832. Another of his well known hymns is *The Morning Light is Breaking.* He also wrote several books, including *Missionary Sketches, Rambles in Mission Fields* and a *History of Newton, Mass.*

Smith, Sydney (1771-1845), a British wit, editor, and clergyman. He was the son of an Essex gentleman who "bought, altered, spoiled, and sold about nineteen estates in England." A natural gaiety is traced to an inheritance of French Huguenot blood. Sydney was educated at Oxford. He became the curate of a small, uncongenial parish on Salisbury Plain. Later, while in Edinburgh supervising the education of a young Englishman, he fell in with a knot of bright young men who were dissatisfied with social, literary, and government conditions. He proposed the establishment of a radical periodical. The result was the appearance, October, 1802, of *The Edinburgh Review,* of which Smith was made the first editor-in-chief. Some idea of Smith's wit, seeing that the promoters were all without money, may be had from his suggesting a Latin motto for the new review, meaning in English, "We cultivate literature on a little oatmeal." His friends thought the proposed motto too literal. Subsequently Smith held pastoral charges in London and in Yorkshire. He wrote for the *Review* twenty-five years. He held good livings, but his views were too radical to permit his appointment to a bishopric, an advancement on which his friends had set their hearts.

Smith College, the largest women's college in America. It was chartered in 1871, and opened at Northampton, Massachusetts, in 1875. The bequest which made the college possible, about $365,000, was given by Miss Sophia Smith of Hatfield,

Massachusetts. The high standing which Smith College has enjoyed from its opening is due in a great measure to the noble work and inspiring leadership of L. Clark Seelye, its president until 1910. Dr. Seelye was succeeded by Dr. Marion LeRoy Burton. There are ninety-seven instructors at Smith, a large proportion of whom are men, and about 1,600 students. A number of scholarships are available to able students with little money. The equipment of Smith is excellent and there are a number of small dormitories. The Hilyer Art Gallery contains fine collections of pictures with a large endowment for their enlargement. Excellent training in music and art is offered, besides the usual college course, which, after the freshman year, is largely elective. The college confers the degrees of A. B. and A. M. Women who go to Smith are made to feel that the new student is entitled to as much consideration as the senior; that class, degrees, and other "pigeon-holing devices" count for nothing; character and ability for everything.

Smiths Falls, Ontario, an industrial center, is on the Rideau River and Canal and on the Canadian Northern and Canadian Pacific railroads, 45 miles south of Ottawa and 60 miles northeast of Kingston. Notable features of the city are the public and separate schools, collegiate institute and library, theaters, town hall and market hall.

Smith Falls has manufactories of malleable castings, bricks, sash and doors, buttons, stoves, agricultural implements and machinery, flour and grist, and cooperage stock. Hydro-electric power is used in many of the factories; and the local power distributing plant is owned by the city. The population was 6,790 in 1921.

Smithsonian Institution, an establishment at Washington, D. C. It was founded in pursuance of a bequest made by James Smithson, an illegitimate son of the Duke of Northumberland. He was a man of scientific tastes and great usefulness. He was offended by the treatment he had received from his father, and decided to found an institution in the New World, that "my name," said he, "shall live in the memory of men when the titles of the Northumberlands and the Percys are extinct and forgotten." He died at Genoa, Italy, in 1829, leaving the following instructions: "I bequeath the whole of my property to the United States of America to found at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge among men." Congress accepted the bequest and appointed a board of administration, consisting of the president, the vice-president, the chief justice, the members of the cabinet, three members of the Senate, three of the House, and six citizens, no two from the same state. The bequest amounted to half a million dollars. Congress has added liberally to it.

The Smithsonian occupies a large building erected on public grounds at Washington. The secretary of the Smithsonian has been charged by Congress with the custody of the National Museum in which are exhibited the specimens of natural history, rocks, minerals, archaeology, Indian relics, etc., coming into possession of the United States. Smithson's own cabinet of minerals is stored here. A very great collection of stone knives, hatchets, and other American antiquities, including specimens from the ancient homes of the mound dwellers, the Aztecs, and the cliff dwellers, has been accumulated. There are in all nearly 6,000,000 articles. The Smithsonian funds have been loaned to the general government. The income has been used largely to defray the cost of publishing scientific works. Perhaps 300 volumes in all have been issued. In 1904 the remains of Smithson were brought to Washington from Genoa. They have been accorded a fitting resting place on the grounds.

Smoke, a vaporous mixture discharged from a fire. Damp fuel gives more smoke than dry fuel. The American Indian who wished to escape observation made his campfire only of the driest wood. The dark color of smoke is due to unconsumed particles of fuel, that is to say, of carbon. When a lamp smokes, the oil is vaporizing before it is entirely consumed. In case of perfect combustion, the gas which escapes from a chimney or smokestack is invisible. Black smoke is certain evidence that a part

of the fuel is escaping into the atmosphere. The smoke nuisance is a serious matter in manufacturing cities and near railroad yards.

Smokeless Powder. See GUNPOWDER.

Smollett, Tobias (1721-1771), a British novelist. He was born in Scotland, and was educated as a surgeon. He resided for a time in Jamaica, then in London. He began the practice of surgery in London but gave much of his time to writing. His works include both prose and poetry. He wrote an extended *History of England,* which rivalled in popularity that of Hume. He was for a time editor of the *Critical Review, The British Magazine,* and the *Briton.* He is the founder of the satirical novel and ranks with Fielding and Richardson among eighteenth century writers of fiction. His most notable work is *Humphry Clinker,* "the most laughable story," said Thackeray, "that has ever been written since the goodly art of novel writing began."

Smuggling, the offense of importing or exporting goods without paying the duty imposed by law. The term is also applied to bringing into a country goods whose importation is forbidden by law.

See CUSTOMS; TARIFF.

Smuts, Jan Christian (1870-), a British statesman of Boer descent, born in South Africa and educated at Cambridge University and Victoria Law College. He practised law for several years in Capetown and Johannesburg, and in 1898, became attorney for the South African Republic. At the outbreak of the South African War in 1899, he joined the Boer forces and gained a wide reputation among the Dutch by his conspicuous services. He accepted the terms of peace and became a loyal British subject, working with General Botha for the upbuilding of the Union of South Africa. During the Great War, Smuts was the organizer and leader of the forces that broke the power of Germany in Africa. In 1917-18 he represented the Union of South Africa in the Imperial War Cabinet at London and at the Peace conference at Versailles, where his judgment was highly valued. On the death of General Botha, Smuts succeeded him as Premier of the Union of South Africa and was re-elected in 1921. Smuts is regarded as one of the ablest statesmen of his day, and Great Britain gives him the distinction of being the first to propose a plan for the League of Nations.

Smyrna, smĕr'na, the chief commercial city of Asia Minor, under Grecian protection, situated on the Persian Gulf 45 miles from the Mediterranean. Ancient Smyrna is important in the history of Greece and Rome. The church at Smyrna was a favorite with the apostle St. John and played its part nobly in the sufferings and martyrdoms of the early Christians. The modern city has a population of about 350,000, half Greek. It is located in a beautiful amphitheater of green hills, but the city itself except for a broad quay and brilliant bazaars is unattractive. The streets are crooked and dirty. Franks, Armenians, Turks, and Greeks live in separate quarters. The merchants of Smyrna purchase large quantities of cotton and woolen goods, coffee, sugar, iron, coal, hardware, lumber, glass, butter, petroleum, and leather, which they sell locally or distribute by means of railroads and the numerous caravan routes which radiate from the city. Smyrna is the fig city of the world.

Smyrna was taken by Turkish Nationalists under Kemal Pasha in the second week of September, 1922, and was almost entirely destroyed by fire. In their retreat toward Smyrna, the Greek troops destroyed many villages; this so incensed the Turkish troops that when they reached Smyrna they were ready to wreak vengeance.

Indiscriminate pillage and killing began immediately upon their entrance into the city. Merchant and war ships in the harbor stood by, helpless, as the flames mounted into the hot September sky. The frenzied civil populace crowded the wharves, and the vessels in the harbor began collecting cargoes of refugees as soon as possible. Those who could not get aboard seaworthy ships, took to the water in leaky rowboats and even on planks, in an effort to leave the terror ridden city. Reports as to the cause of the fire are conflicting. It is believed by some that the Turks wantonly put the city to the torch, while others believe that Greek and Armenian refugees started the fire, in order that

1. Mountain snail. 2. Wood snail. 3. Vineyard snail. 4. Burrowing slug. 5. Garden slug. 6. Agate-shell, Africa. 7. Round-mouthed snail. 8. Glass snail. 9. Land snail. 10. Amber snail. 11. Rivert limpet. 12. Pond snail. 13. Spiral pond snail. 14. Swamp snail. 15. Pond snail.

SNAILS AND SLUGS, CHIEFLY EUROPEAN.

their property might not fall into the hands of the invaders.

Snail, a common name for a number of mollusks. They are chiefly terrestrial, carrying their shells on their backs and creeping slowly by means of a sucker-like projection or foot, in some species covering the whole side of the body. There are over 5,000 species. The head of the garden snail is furnished with four stalks, two long and two short. At the tips of the long ones are black knobs, the "stalked eyes" of the snail. Most land snails breathe by a single lung. The lung opening may be seen.

The shell of a snail is of interest. The pointed end is the apex. The large opening is the aperture. The edge of the aperture is the lip. The spiral groove on the outside, running to the apex, is called the suture. The turns of the shell between the grooves are called whorls. The whorls, all taken together, excepting the largest or body whorl, constitute the spire. Hold the apex up, the aperture toward you. If the aperture is toward your right hand, it is a dextral or right-handed shell. If towards your left hand, it is a sinistral shell.

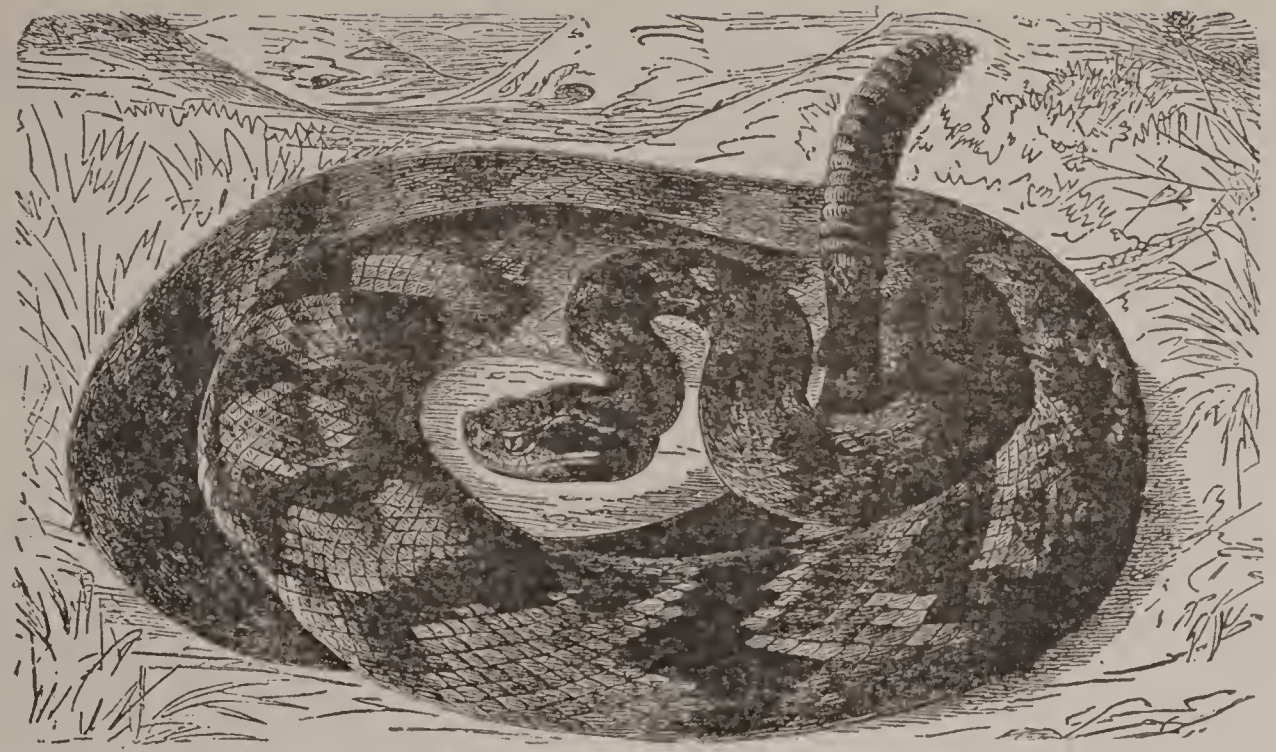
The food of the snail is green leaves and the like. The tongue is red and is roughened like a rasp. The egg of a snail is large and is surrounded by jelly which the young snail does not leave till it has a tiny shell of its own. The shell of a snail is made and mended by a juice from the body which is at first sticky and hardens into shell. We have two common forms of snail shells, one simply coiled, the other twisted. We have sixty to seventy-five different species in the United States.

The Romans made a specialty of snails for table use. The edible snail of southern Europe, still used for food, is as large as an apple. Snails fattened in Switzerland are sent to the Vienna market. They are eaten in the season of Lent. Snail soup is served in the restaurants of Paris. Slugs are very much like snails, having, however, only a vestige of a shell. When extended, the various species measure from one to three inches in length.

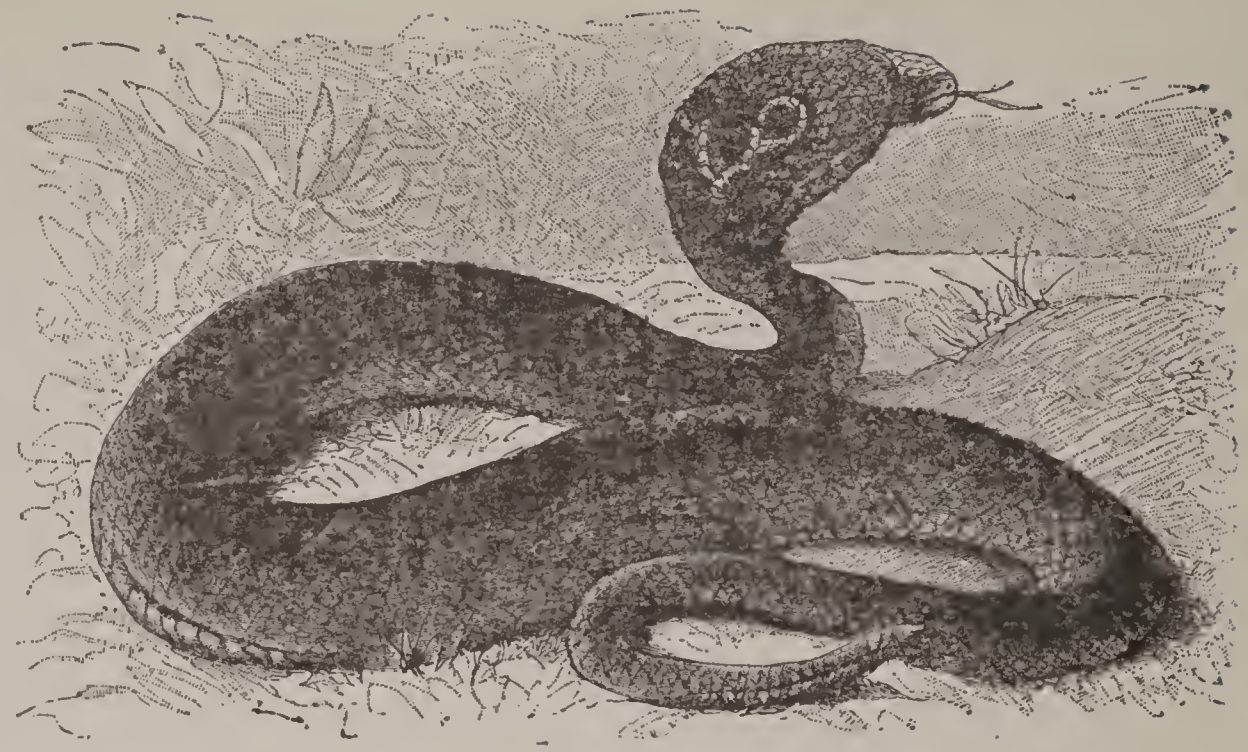
Snakebird. See ANHINGA.

Snake River, or **Lewis River,** a stream which rises in the mountains of Wyoming, and flows in a general northwesterly direction into the Columbia. It is formed by the union of two streams called the North Fork and the South Fork. During a part of its course it forms the boundary between Oregon and Idaho, and again between Washington and Idaho. The total length of the river is about 1,000 miles. The Snake runs through a mountainous country. The descent between the union of the Forks and the Columbia is 4,440 feet. A large part of the course lies through wonderful cañons 1,000 to 3,000 feet deep. There are numerous mountain springs so large and so deep that they have worn side cañons for themselves. In many places the springs issue from precipitous rock faces, down which the water comes in cascades. Among the wonders of the Snake are the Shoshone Falls in Idaho. The cañon here is 700 feet wide, and 750 feet deep above the falls. The river flows silently and evenly to the very verge of the rapids, where the water spreads out like a fan, and, after falling over preliminary precipices some half a hundred feet in height, it gathers itself together and leaps 210 feet sheer. The foaming waters continue their course through a cañon 1,000 feet deep. The Snake, called the Shoshone by the Indians, is navigable from its mouth as far as Lewiston. The waters are clear and cool and are, it is needless to say, stocked with mountain trout, although being on the edge of a desert.

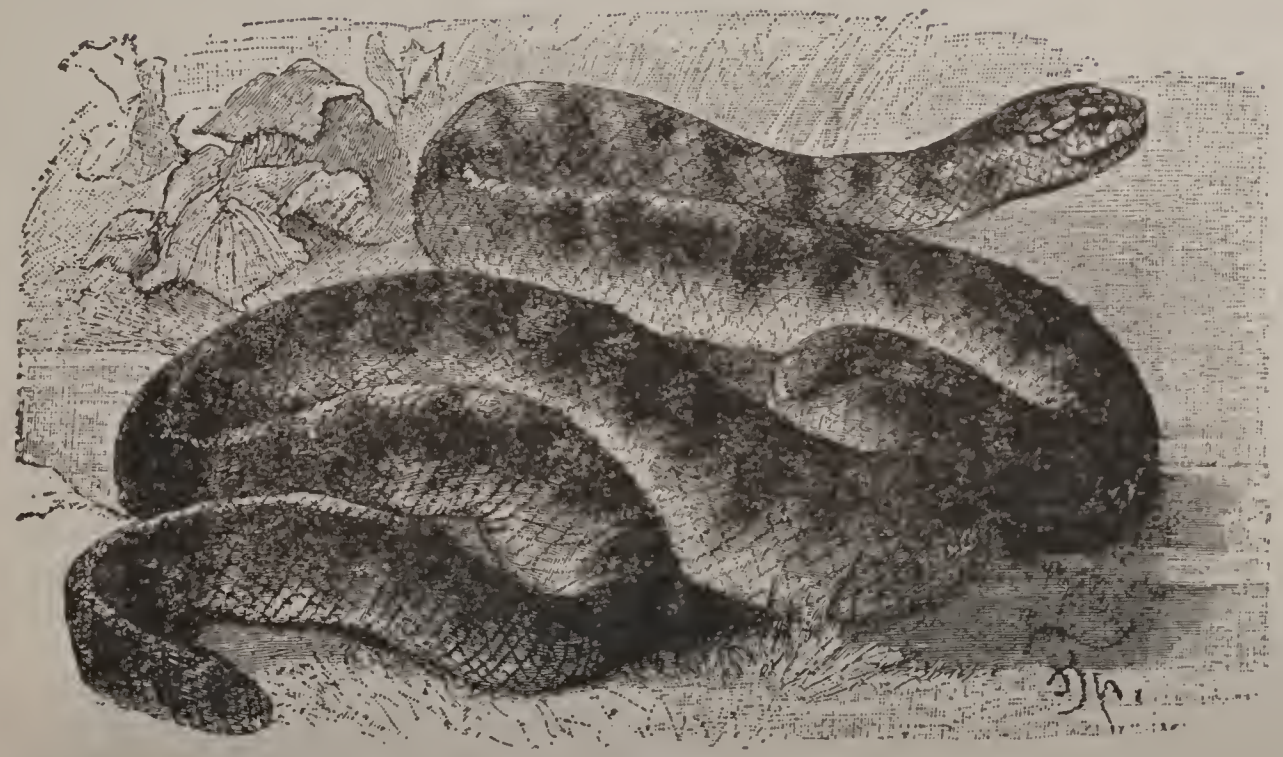
Snakeroot, a name given to a number of different plants because of their snake-like roots, or their underground stems. The black snakeroot, or black cohosh, has a thick-knotted rootstock, or underground stem, which can be distinguished from a root by the tiny scales or reduced leaves found on it. A root, never having had leaves, cannot bear such evidences of them. The Canada snakeroot, more commonly known as the wild ginger, has a pungent, creeping rootstock. Some plants are called snakeroot because of their ability, real or fancied, to cure snake bites. Such is the Indian snakeroot, whose very bitter roots are used for that purpose by the natives of India. Both the Virginia and Texas snakeroot have medicinal properties. There are several varieties of snakeroot besides those mentioned.



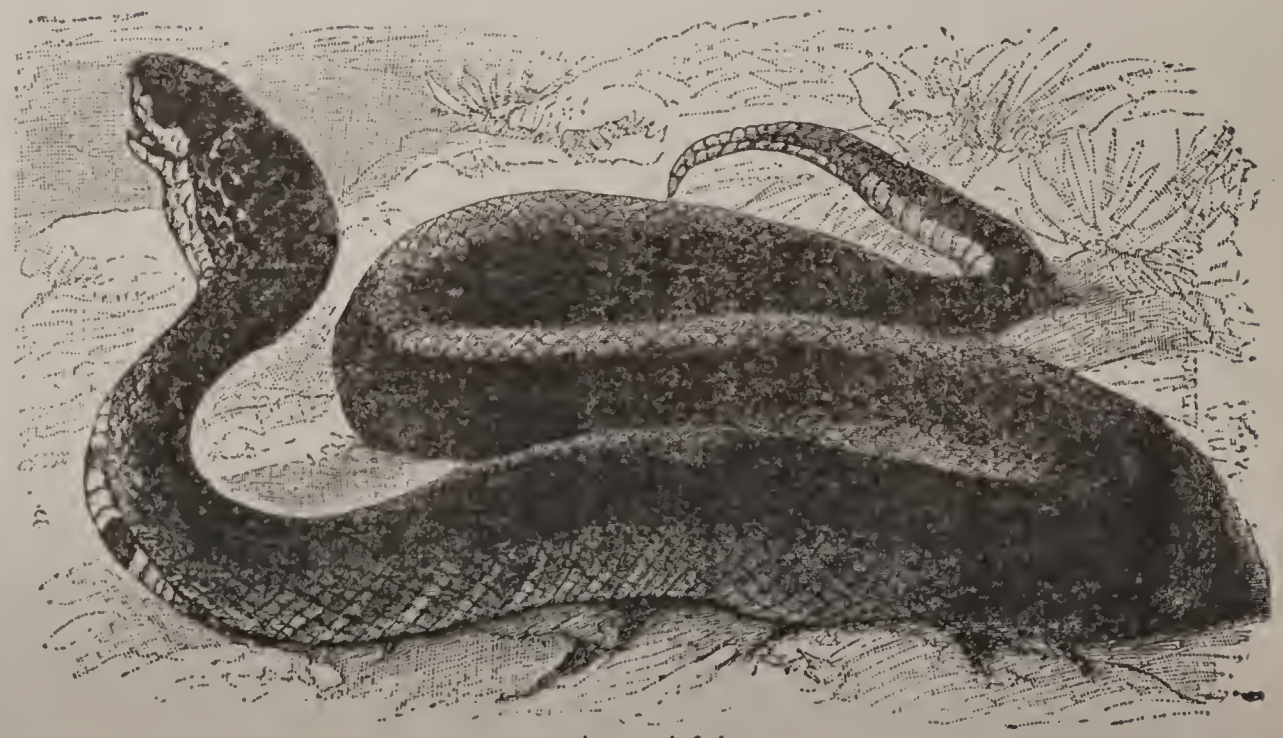
Rattlesnake.



Cobra, India.



Water snake.



Asp, Africa.

SNAKES.

Snakes, the common name applied to serpents, one of the classes of reptiles. The entire order of reptiles is repulsive unless an exception be made of the lively southern chameleon. There are about 2,000 species. Their circulation is low. Their blood is cold. Their habits are sluggish. Their digestion is slow. In temperate climes they are torpid over winter. None of them requires a warm covering, as of hair. They can go without food for long periods and can remain under water without breathing for a considerable length of time. No reptile hatches its eggs by nesting on them, though the pythoness keeps guard until the sun has done the work. Many species bring forth their young alive. Separate articles may be consulted for the leading animals of the phylum. It may be convenient to refer to the following classification of living reptiles:

I. Crocodilians—gavial, crocodile, alligator.
II. Tortoises—terrapin, turtles.
III. Lizards—iguana, slow-worm, "glass" snake, gila monster, horned "toad."
IV. Serpents—boa, python, black snake, garter snake, copperhead, moccasin, viper, rattlesnake, cobra.

See ANACONDA; ASP; BOA CONSTRICTOR; COBRA; PYTHON; RATTLESNAKE; VIPER.

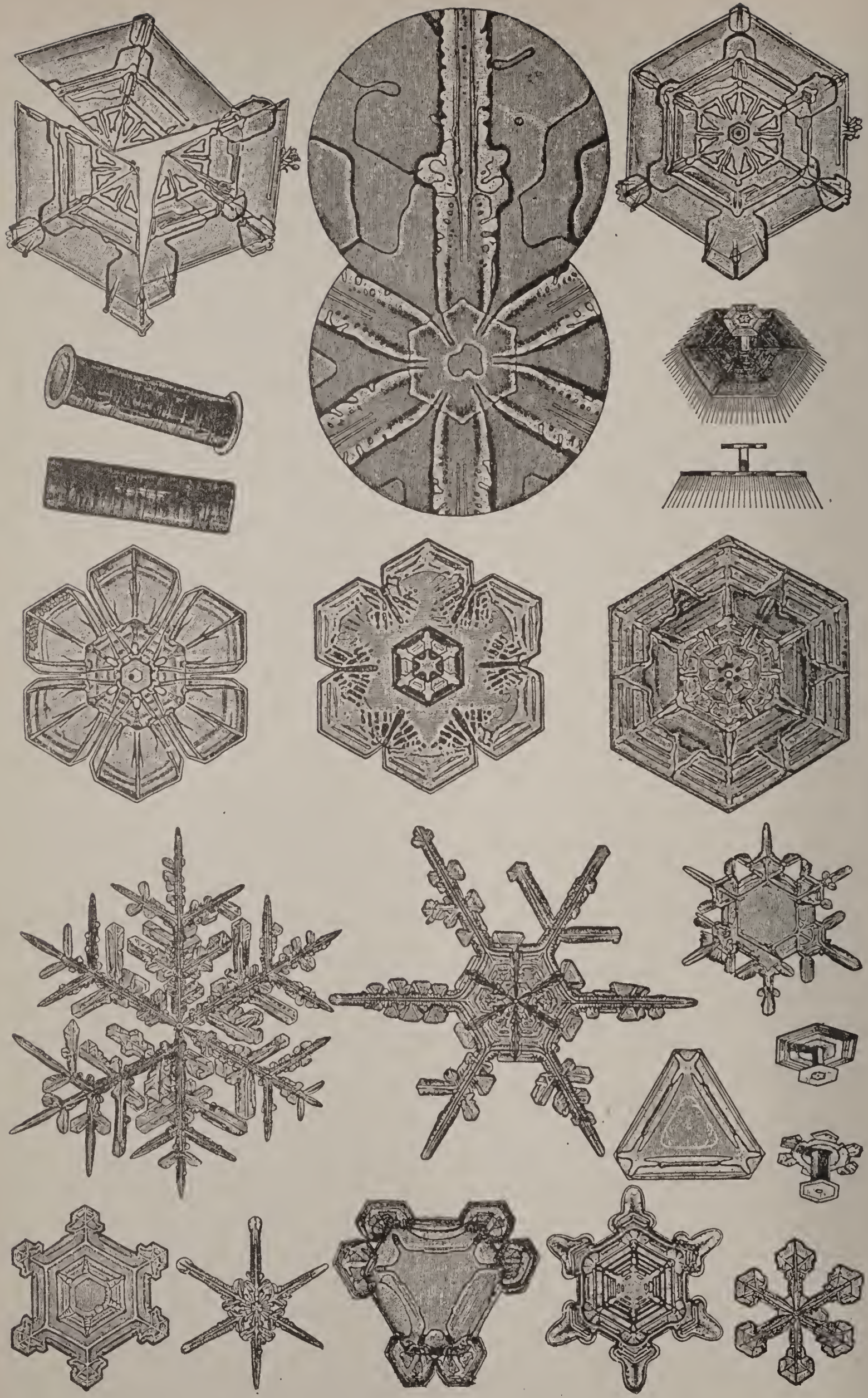
Snapdragon, or **Antirrhinum,** an old-fashioned garden flower. The common snapdragon is a biennial from one to three feet in height. It has large tubular flowers, having spreading, erect lobes and arranged in a long spike or head. In color, it ranges from red and purple to white. The snapdragon is related to the figwort, betony, foxglove, veronica, digitalis, painted cup, monkey flower, etc.

Snipe, a family of seacoast and inland shore birds. Including the sandpiper and the woodcock, the family numbers a hundred species, forty-five of which are native to North America. They all have bare legs for wading and long straight bills for probing soft soil. The nest, usually in open ground, is a mere depression in the earth, lined, it may be, with short bits of grass or weeds. The Wilson snipe, ranging from South America to Hudson Bay, is one of the largest species and is prized by sportsmen. The large upland plover, that alights on a fence post and stretches its wings above its back before folding them softly, is a snipe rather than a plover, the plover having a short bill. In time of abundance, snipes are generous feeders, devouring, it is said, their own weight of food daily. See BIRD; SANDPIPER; TURNSTONE; WOODCOCK.

Snorre Sturleson (1179-1241), a distinguished Icelander. He was born at Hyamm and was assassinated on his estate, Reykjaholt. He was a judicial officer of high standing. He visited Norway twice. He wrote Heimskringla, being the sagas of the Norwegian kings. He is claimed by some as the author of the *Younger Edda.*

Snow, crystallized forms of water. Snowflakes are formed in the air by innumerable particles of moisture that gather together according to some physical law, invariably in flat six-sided bodies. In 1902 the United States Weather Bureau published a bulletin entitled *Studies Among the Snow Crystals,* giving a large number of snowflake patterns, photographed by Mr. W. A. Bentley of Jericho, Vermont. He photographed over 1,100 snowflakes, all built on the same plan, but no two alike. By catching the flakes on one's coat sleeve when they are falling quietly through the air, the six-pointed arrangement can be seen with the naked eye. A magnifying glass is a great help, however, in making out the different patterns, many of which are of extreme delicacy.

Snow forms in the upper regions over all parts of the earth, both land and sea, but in the tropics it melts into rain before reaching the ground. The area around each pole above 80° of latitude is a region of perpetual snow, to which must be added the tops of high mountains everywhere. Starting at the sea level, at 80° of latitude, the line of perpetual snow rises higher and higher as it approaches the equator. At 70° it is about 1,000 feet above sea level, and at 60° over 5,000 feet. At 30° the line is over 13,000 feet above the sea, and on the equator it is at least 16,000 feet in altitude. Beneath the line of perpetual snow, a coating of snow is assured in winter to within 45° of the equator, and occasional snow-



SNOW CRYSTALS.

storms advance much nearer the tropics.

To those who live in tropical countries, snow is an object of dread. Those who are accustomed to snow and who understand it, see in it a wise provision of nature. Snow, being a poor conductor of heat, serves as a warm blanket that preserves the crust of the earth from losing its heat and from freezing to great depths in the winter time. A field that lies under snow seems to be in better condition for crops. Farmers in the wheat region sometimes say, "For every inch of snow, a bushel of wheat." In lumber regions, too, snow not only fills up ruts and affords a secure road, but teams can draw very much heavier loads on runners than they can on wheels. A snowy winter, if not too deep, is considered favorable for logging operations, for the accumulation of water in the form of snow made available all at once in the springtime, raises mere brooks into torrents that carry the lumberman's logs away to market.

On the other hand, a deep snow often renders it difficult to get around in the woods. Sometimes the fall is so great in the pine forests that it is impossible to bring out logs. Deer and other animals with sharp hoofs have great difficulty in getting about, especially when warm days form a thin crust of ice through which they break at every step. In time of heavy snowfall the squirrels and many other animals learn to burrow under the snow in traveling to and from their hoards of food. Partridges and prairie chickens frequently hole up for the night in loose snow.

In mountainous countries, accumulations of snow frequently slide down into the valleys, blocking up roads and sometimes destroying villages. Some of the transcontinental railroads build long tunnels or snow sheds of heavy timbers to protect their tracks in the mountain valleys. In prairie countries particularly, the snow that drifts into railroad cuts is a serious impediment to travel.

See SNOWPLOW; SNOWSHOE; TOBOGGAN; SKI; REINDEER; ICE.

Snowbird, a term often applied to the snow bunting or snowflake. It is a white sparrow-like bird with jet black markings. It breeds in the Arctic regions building a nest on the ground of coarse grass and moss lined with feathers. In the winter season it visits the northern United States in flocks to seek food. It feeds exclusively on seeds found in weed tops, and seems to enjoy our bright, wintry weather. The recollection of a snowstorm with a flock of white buntings careening joyously through the fields is one that lingers long in the memory. "The snowbuntings are the true spirits of the snowstorm," says Thoreau. "They are the animated beings that ride upon it and have their life in it." Another sparrow-like bird, often called a snowbird from its seeming frequency during a snowstorm, is the slate-colored junco with white outside tail feathers. It breeds and ranges farther south than the snow bunting. A snowstorm brings the juncos into one's dooryard, but the snow bunting stays afield.

See WINTER; SPARROW.

Snowbound, a Winter Idyl, a poem by Whittier, published in 1865. *Our Young Folks* was one of the first periodicals for young people in the United States. Its publishers, desirous of obtaining strong writers for the early numbers, made application among the first to John G. Whittier, requesting him to write about his boy life. In response to a second letter from Mr. James T. Fields about the contribution, the poet replied substantially: "Oh, the matter has grown beyond all bounds! Thee wanted twelve stanzas, and three times that are now written, and the story has scarcely begun, and, moreover, I fear thee will not like it." Mr. Fields telegraphed, "Send it along and let me judge for myself." The next morning Mr. Fields thrust the first pages of "Snowbound" into the hand of his colleague remarking: "What do you think of that for a Christmas book? There is a picture in every line," and truly it was so. The sheets were sent back with just eight words attached. "Make it as long as you can. Splendid!" The poem appeared in the Christmas number, and has been a favorite ever since with young and old. It is a picture of New England country life fifty years ago. It is full of beautiful descriptions and noble thoughts. It has been called the "most charming idyl in American poetry," and there is surely no more delightful picture of happy home life.

Snowdrop, or **Galanthus,** a small, white, spring-blooming bulb. The dainty flower hangs like the amaryllis, to which the snowdrop is closely related. The heart of the flower consists of a green and white tube, with six tips, "a heart-shaped seal of green." In cultivation the habits of the snowdrop are like those of the lily of the valley. There are numerous species. The common snowdrop is native in the mountains of the Mediterranean region from the Pyrenees to the Caucasus.

Snowline, the limit above which a mountain is covered with snow the year around. It is well known that the air grows cooler the greater the altitude. The snowline is reached as soon as the air is too cool to melt the snow. The snow limit varies under different conditions. It is higher at the equator than in a temperate clime, and is lowest, of course, in the Arctic regions. In the Andes of the equator the snowline lies at an altitude of 16,000 feet. In the Alps it is from 8,000 to 9,000 feet above sea level.

Snowplow, a device for clearing away the snow from sidewalks, roads, railroad tracks, and the like. The village snowplow used for clearing sidewalks is a simple affair of two heavy planks set on edge and framed together in the shape of a letter V. When drawn along a sidewalk or road, point forward, by a team, it crowds the snow outward on either side, leaving a clear passage. When the railroads first attacked the problem of clearing their tracks, a large V-shaped plow of this sort was mounted in place of the cowcatcher in front of the locomotive. When a locomotive drove into a drift, the snow was split and thrown out on either side of the track. When the engine could go no farther it backed down for a few rods or even a mile or two to gather steam and then "bucked" the drift again. Sometimes two engines were used to give additional force to the blow, and not infrequently both became involved in a drift so deep that they had to be shoveled out. This form of snowplow reinforced by a set of brushes to sweep the rails is still in use, but the great drifts of the Northwest are now handled by the rotary snowplow. Its apex consists of a huge wheel of oblique, paddle-shaped blades driven by steam. It whirls at the front end of an open drum. It looks something like a large ventilating fan. As the plow advances into the drift, these blades cut away the face of the snow bank, flinging out the snow with furious haste in a perfect cloud, visible miles away. Railroad cuts that formerly remained closed with snow all winter, requiring remote towns, especially on branch lines, to obtain their mail and other necessities at great inconvenience and often at real peril of life, are now opened up within a few hours by the steam rotary. Snow plows are being improved every year.

Snowshoe, a contrivance for walking on snow without sinking. The toes of the prairie chicken, the partridge, the rabbit, the lynx, and many other wild animals are provided with spreading, horny flanges, hair, bristles, or thick fur that enables these inhabitants of cold countries to run or leap on soft snow without sinking. Taking a hint from them, the northern woodsman constructs a pair of snowshoes for the same purpose. A strip of strong, flexible wood is bent into the shape of an ellipse, round in front and prolonged somewhat in the rear. Thongs of rawhide, perhaps half an inch in width, are passed back and forth at intervals of two and three inches, care being taken to interweave them in such a way as to form a sort of web, strengthened by a single crosspiece of wood. The entire contrivance is not unlike a large tennis racket with the handle cut off. It is from a foot to a foot and one-half in width and about three feet in length, and is fastened to the foot by a thong passing over the toe of the wearer's moccasin, thus leaving his heel free to rise. In walking, the woodsman lifts the toe of the shoe slightly and slides it along the snow, then advances the other shoe in like manner. With a pair of good shoes one can walk over fresh snow without inconvenience. Those who have become experts in their use can overtake a deer as it flounders along through the deep snow, and can travel with speed and safety across leagues of country through which it would be impossible to pass without aid. In Canada and the northern parts of the United States, snowshoe racing has become a popular form of winter sport. For an account of the wooden snowshoe, see SKI.

Snuff, a powder made of tobacco. The expensive qualities are made of fine leaf; the cheap, of stems and rejected portions of the leaf. The moist snuff known as French *rappee* is made by the French government. The leaf is put through a process of fermentation and the snuff undergoes a second process of a similar nature. Between fermenting, grinding, curing, and dampening nearly two years are spent in making the finest product. A number of perfumes, as musk, lavender, rose, clove, and jasmine are used. Irish, Scotch, and Copenhagen snuff are of the sort known as dry. Snuff-taking was quite the thing in court circles at the close of the seventeenth century. A snuffbox ornamented with costly gems was a gift fit for a prince. Snuff-taking has held on in Scotland as persistently as in any country. For a Scot to offer a pinch from his "mull" or snuffbox is an act of fellowship. A recent writer places the consumption of snuff in the United States at 9,500 tons a year. See TOBACCO.

Soap, a well known household article used for cleansing and washing. Soaps differ greatly in appearance and quality, but all alike are made of some fatty substance compounded with potash or soda. Old-fashioned soft soap may be made of wood lye, leached from the ashes preferably of some hard wood, as maple, hickory, oak, or beech, and scraps of fatty matter from the kitchen. There are almost as many soaps as oils. Laundry soaps are made usually from tallow or cotton-seed oil. Yellow soaps owe their color to a certain addition of rosin, which is not only cheaper, but rather improves the quality of the soap. White soaps are made usually from tallow, palm oil, or cocoanut oil. Castile soap is made from olive oil, with the addition usually of oil of cocoanut. A mottled appearance is produced by the addition of some coloring material. Palm oil makes an excellent toilet soap.

Soap is made usually in a large mass in vats or kettles, and is cut into cakes of the required size by wires. These cakes are then pressed in a mold, provided usually with lettering by way of a stamp. The toilet soaps are made with especial care. Their delicate odor is imparted by the admixture of some volatile oil by way of a perfume. Transparent soaps are made by dissolving a toilet soap in alcohol. The solution is then poured off, leaving the dregs behind. When the alcohol is distilled, the residue, consisting of the soap, is beautifully transparent. Many soaps are made transparent also by the addition of glycerine well stirred in. Scouring soaps are common strong laundry soaps with a grit secured by an intermixture of finely powdered sand, glass, or pumice stone.

The making of soap and the making of candles have long been linked. Fat the chandler could not use for candles he turned into soap. The common grades of American soap are now turned out as a by-product of the great packinghouses. Someone has said that the general use of soap is an index of advanced civilization. In 1921 the United States soap and candle manufacturers turned out $316,740,115 worth of products. There were 348 establishments. Small manufacturers are being forced out of the business by the larger concerns. An attempt to form a British soap trust was foiled in 1906 by the British public refusing to buy soap not bearing the stamp of an independent maker. See OIL.

Soap Bubbles, bubbles made by blowing into a film of soapy water. Blowing soap bubbles is an interesting and fascinating pastime. The best results are obtained by using rainwater, or, at least, water free from lime. Any good soap will do; castile soap is excellent. The soap and water should be whipped until bubbles cover the suds. A few drops of glycerine make the bubbles tougher. A clean clay pipe is best. The operator dips the pipe into the suds in such a way that on lifting it a film is spread across the lip of the bowl. There should be no suds in the bowl. By blowing through the stem with care, the film will stretch and assume a spherical shape. If thrown off from the pipe, the hole in the bubble is closed by the elasticity of the film and the bubble will float away, or fall to the floor. A strong bubble will bounce on reaching the floor or roll about like a toy balloon. As soon as the film becomes too thin by loss of moisture through evaporation, the bubble bursts into spray. By being satisfied with small bubbles at first, a little practice will enable a learner to blow bub-

bles several inches in diameter. A handful of foam caught and held between the hands may be blown into a large bubble.

Many other substances, as hydrogen, illuminating gas, and melted glass, may be blown into bubbles. Hydrogen makes the lightest bubble known. Melted resin may be blown into bubbles that retain their shape on cooling. Soap-bubbles have been made the subject of no little scientific investigation. A Mr. Boys, an English scientist, became so expert that he was able to blow two bubbles, one within the other. The thickness of the ordinary film before bursting has been computed at $\frac{1}{21980}$ of an inch.

Soapstone. See TALC.

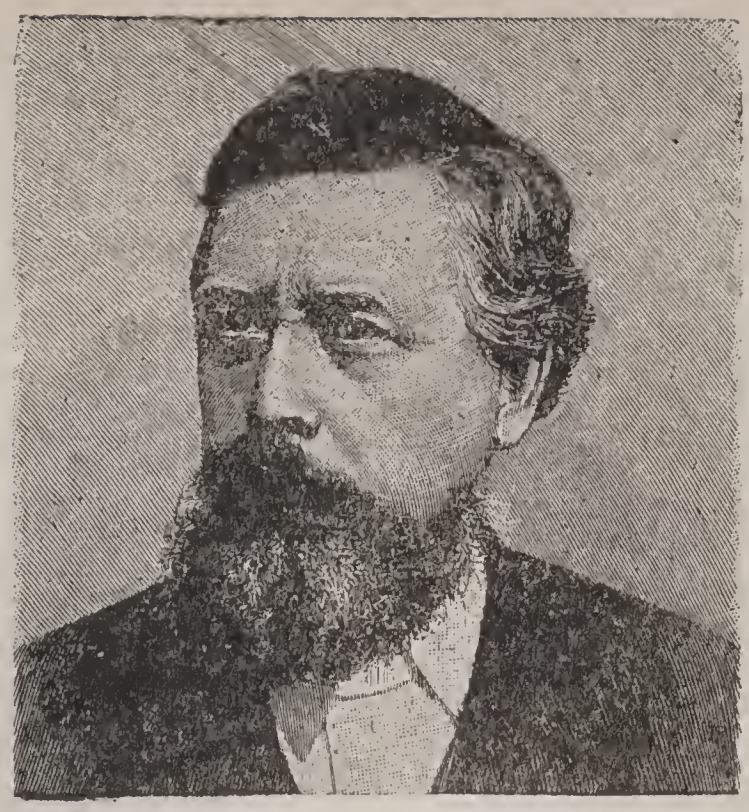
Social Settlement. See ADDAMS, JANE.

Socialism, sō′shal-ĭzm, a theory of society organization based on the public ownership, that is to say, the government ownership of the means of production. It is to be distinguished carefully from anarchy. The anarchist desires less government regulation than we now have. The socialist desires more. Socialism should also be distinguished from communism. The members of numerous communities, as the Shakers, both in America and Europe, believe in the ownership of all property in common. The socialist believes that the greater part of the world's wealth should be held and controlled by the people through their governments, but that independent earnings, independent property, and independent homes should be not only permitted, but encouraged. Even then socialism is difficult of definition. The support of public schools, the conduct of a national postoffice system, and the maintenance of free roads, bridges, and ferries are socialistic measures. Municipal, that is to say, city ownership of waterworks, lighting plants, street railways, and their management in the interest of the public at as low charge for service as may be, are socialistic measures. State ownership of railroads, express lines, telegraphic and telephone systems are socialistic measures. National savings banks and national provision for old age and sickness are also socialistic tendencies. Socialists believe, however, that the people should go still farther. They hold that land, mines, and forests should never pass from the ownership of the people, and that individuals should never be permitted to own, but merely to use them. Socialists believe, also, that the people should own the mills, factories, and other industrial concerns of the country. For example, the people, through their government, should own the flour mills. The officials in charge should pay the farmer as liberally as possible for his wheat, pay good wages to the mill operatives, and sell the flour to the consumer at cost. The farm wagon may serve as a further illustration. According to the socialist idea, coal, iron ore, paint, and timber should be public property and should be furnished the wagonmaker at the cost of labor. It is estimated that the labor involved in mining, sawing, grinding material, and in shaping the parts of a wagon and in putting them together costs $10. This is for such a wagon as sells for from $50 to $70. If materials were free, *i. e.*, owned publicly, the socialist argues that wages might be doubled, and yet the farmer could buy his wagon for $20.

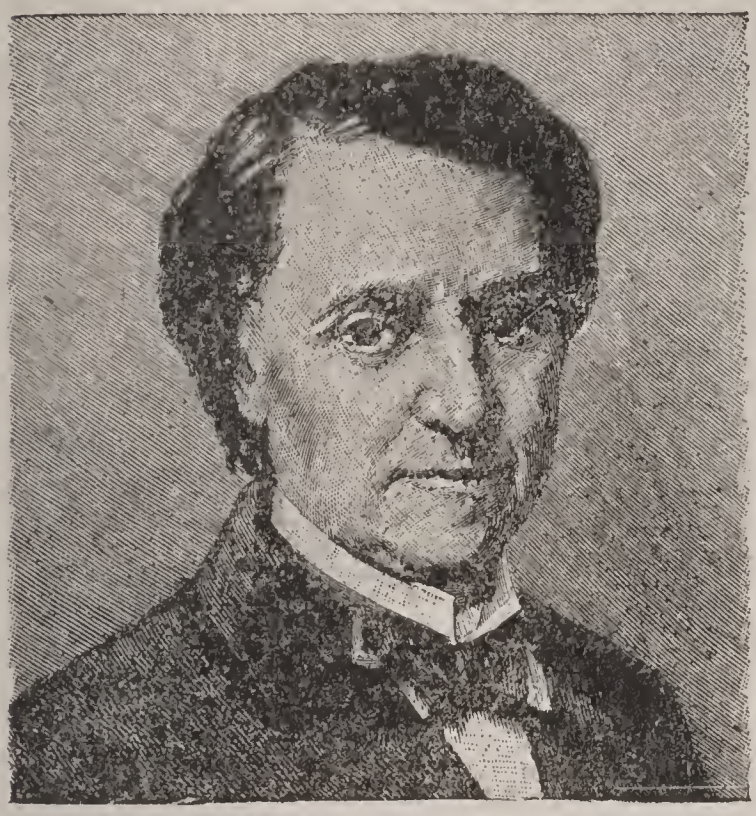
By managing manufactures, transportation, banking, and other enterprises of a public character in this way, the socialist hopes not only to reduce the cost of living to the people, but to prevent the creation of wealthy manufacturers, railroad magnates, and bankers. By taking away the opportunity of engaging in enormously profitable undertakings, the socialist would prevent the rise of millionaires. The socialist has no desire to equalize property. He does not think it possible or desirable to reduce all men to the same level, but he believes that, through government management, the poor can be given a better chance and the wealthy brought down more nearly to the level of the ordinary man. He believes that much of the world's misery arises from competition which could be avoided under government management.

SOCIALISM AND THE WAR. Both as a political organization and as a force within the old parties, the socialists had gained ground rapidly previous to the war. American socialists worked constantly to keep the United States out of war. Entering into the war caused a split in the party. Some of the pro-war members withdrew and combined with other radical groups to

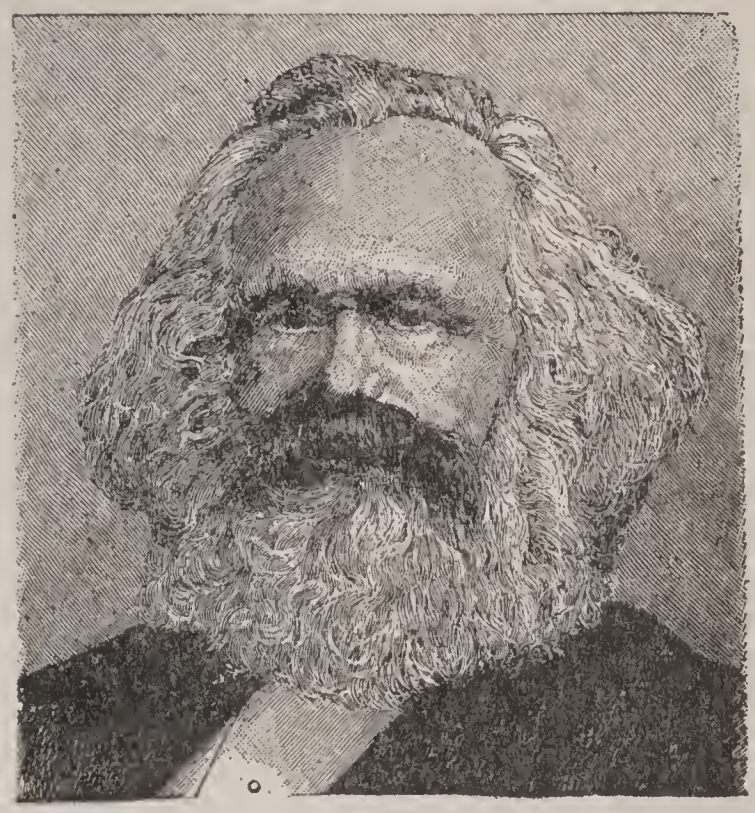
Ferdinand Lassalle.



Wilhelm Liebknecht.



Louis Blanc.



Karl Marx.

François Marie Charles Fournier.

Robert Owen.

PROMINENT SOCIALISTS.

start a national organization, but the movement failed.

The war left society in Europe in a disorganized state and there were various plans for reorganization. But, as Prof. Hobhouse states, the socialists generally believe that the State is bound to be obstructed in effective programs of social reforms as long as militarism remains in our civilization. The French Socialist party in convention January, 1921, voted to affiliate with the Moscow Internationale.

See COMMUNISM; ANARCHIST; NEW ZEALAND; SHAKERS; BROOK FARM; MARX, KARL; LASSALLE, FERDINAND; OWEN, ROBERT.

Socialist Party, an international political party, whose adherents demand the collective—social—ownership and control of the machinery of production, farms, forests, factories, etc. The term "socialism" became current in political writings some years before the Socialist party, as such, was organized. The first known use of the word was made in 1833 in an English journal called the *Poor Man's Guardian.* A few years later it was used in France; but it was in Germany that it was first generally used. As far as can be determined, the first organization of socialists was the *Association of All Classes and All Nations,* founded in England in 1833. The leading nineteenth century exponents of Socialism were Karl Marx and Friedrich Engels, compilers of the *Communist Manifesto. Das Kapital,* the monumental work of Marx, is the basis of modern socialism and the *Manifesto* is a summary of Socialist philosophy.

In 1845 Marx and Engels founded the *German Workingmen's Association.* This was more definitely a Socialist Party than the earlier English organization, and from Germany and Belgium the movement spread rapidly over the world and Socialist parties, drawn as nearly as possible on international lines, soon appeared in all civilized countries.

In the United States the party has had a particularly rapid growth; and though at elections its successes have been few and relatively unimportant, its influence has been considerable. In 1888 the American Socialist Presidential vote was 2,068; this had grown to 442,402 in 1904; and was estimated at 1,000,000 in 1912. Later, the vote fell off.

The American party was founded in 1897 under the leadership of its most prominent living (1923) member, Eugene V. Debs (see DEBS, EUGENE VICTOR). Milwaukee which has a large German population, has always been a stronghold of the party, and the Socialists carried the city in 1910.

Sociology, the science of society, or a study of the laws governing social intercourse. Sociology leaves to the specialized sciences the problems which naturally fall within their scope, and is dependent upon biology, anthropology, statistics, economics, and history, for facts. For conclusions an historical and psychological study of individuals and groups of society is essential. Sociology may be pure or theoretical and deal with the classification of social facts according to natural laws of association; or it may be applied, or practical, and take up the scientific treatment of social problems, those dealing with philanthropy, criminology, etc. The science of sociology is more or less in an undeveloped stage and the views as to the function of sociology as a science are still variant.

Herbert Spencer was one of the earliest sociologists to emphasize the need of applying to society and the products of social intercourse the biological law of evolution. Bastin, the well-known German ethnologist, attempted the application of psychological laws to the study of the social unit and the development of society. Ethnologists relate sociology to the study of primitive man, and the contributions of Maine, Morgan, Letourneau, Brinton, Tyler, Westermarck, Waitz, Ratzel, and Bachofen are valuable. Sociologists who have limited their investigations more closely to the study of contemporary society as such, are Lester F. Ward, Gabriel Tarde, F. H. Giddings, George Simmel, Albion W. Small, J. Mark Baldwin, Le Bon, and Edward A. Ross. Among those who have turned their attention to practical sociology are men and women like Graham Taylor, Robert A. Woods, Charles R. Henderson, Jane Addams, John Graham Brooks, and others.

Socotra, or **Sokotra,** an island in the Indian Ocean south of Arabia.

Socrates, sŏk′ra-teez (470-399 B. C.), an Athenian philosopher. He was the son of Sophroniscus, a sculptor. He received the usual education in gymnastics and music, to which he himself later added a study of literature and philosophy. He was fond of listening to the discussions of the learned men of Athens and endeavored to profit by them. Little is known of his early life. He learned his father's business and worked at it for some years. As a young man he was noted for hardiness and bravery. He served as a hoplite, or heavily armed foot soldier, in various engagements, and became a citizen of repute. On one occasion, shortly after an unfavorable battle, he presided at the meeting of an assembly of citizens. Public sentiment was strongly in favor of punishing severely the ten generals of the day who had neglected to secure the bodies of the slain for burial. Socrates saved them from what he considered unjust public condemnation by refusing to put the motion to vote. On other occasions he stood out staunchly in the assembly against powerful influences and always in favor of what he considered justice and right.

About the middle of his life he retired from business, withdrew from political affairs, and betook himself to a simple course of living and to the instruction of his fellow citizens in the art of right thinking. He is described as a squatty, homely man, with a thick neck and bald head. His nose was flat and upturned; his lips thick. He had a most ungainly gait. He went about barefooted and scantily clad. He disdained the name of philosopher and professed to be no teacher. Every morning he frequented the most public walks; the gymnasium where young people were receiving physical training, and the school where the youth received instruction. "He was to be seen in the marketplace at the hour when it was most crowded, among the booths and tables where goods were for sale. His whole day was spent usually in this public manner. He talked with anyone, young or old, rich or poor, who sought to address him and in the hearing of all who chose to stand by. Nothing could be more public, perpetual, and indiscriminate as to persons than his conversation, and, as it was engaging, curious, and instructive to hear, certain persons made it their habit to attend him in public as companions and listeners."

Our principal accounts of Socrates' discussions are those of Plato, who may be regarded as a successor, and Xenophon. The latter in his *Memorabilia* bears somewhat the same relation to Socrates that Boswell and his *Life* hold to Dr. Samuel Johnson, and, of the two, Xenophon had decidedly the better subject. An excellent English account of his life may be had in Grote's *History of Greece.*

Socrates claimed to be possessed by a familiar spirit, which some have interpreted to be nothing more or less than an active conscience. The Socratic method of leading people to reason for themselves was a simple one. He no sooner heard an egotistical or ill-informed person make some rash statement than he intruded himself with some apparently simple question, possibly, not at first thought, related to the matter in hand. Having secured assent to his proposition, he asked another question, until he had led his tormented victim, point by point, to contradict himself or to acknowledge his ignorance of the subject. This was the destructive side of his work. If, however, his opponent had the good nature, the patience—the good sense, Socrates would call it—to continue the conversation, the old philosopher took equal pains, by asking question after question, to lead on, point by point as before, to a right understanding. This was the constructive side of his work. The Socratic method finds much favor with skillful instructors. It causes the student to do his own thinking. Socrates said of himself that he was no wiser than other men, except that he was more keenly aware of his own ignorance.

It is not difficult to see that this course of conduct followed up day by day made Socrates unpopular. Fops and gallants treated him as they would the plague; merchants and other busy people were impatient by reason of his untimely interruptions; most people thought him a bore; many thought his doctrines impious, and having a tendency to lead the young astray and to destroy respect for that which should be venerated. A few who understood admired him exceedingly. He created an

alarm in politics, as he was accustomed to look into public matters with a degree of sharpness not desired by popular leaders. Politicians, in particular, dreaded his influence. Finally, in 399 B. C., an indictment was brought against him in the public assembly in the following terms:

> Socrates is guilty of crime; first, for not worshipping the gods whom the city worships, and for introducing new divinities of his own; next, for corrupting the youth.

His accusers were a young dramatic poet, a rich leather dealer, and an obscure public orator, all of whom had had their feelings hurt, perhaps repeatedly, by the blunt, uncouth, ever-present, interfering, incorruptible, irrepressible old philosopher. The jury consisted of about five hundred citizens. Socrates was permitted to offer a defense. Instead of striving to placate his judges and to allay resentment, he declared that he held a divine commission to convict men of their ignorance. He declared himself a public blessing and promised that, if left to go unpunished, he would continue to do precisely as he had done. Even then he was convicted only by a mere majority variously stated as from three to thirty. According to custom, his accusers were then called upon to propose one penalty and Socrates another, between which the jury might choose. The former proposed death; Socrates proposed that he be maintained with honor at public expense as a benefactor of his race. At the urgent request of friends, he consented to suggest that a fine of a few cents be imposed on him. Even then, the jury chose a death penalty by a majority of but eighty.

Socrates was sent to prison for thirty days to await the return of a certain ship, during the absence of which it was not lawful to inflict capital punishment. He spent his time tranquilly in prison without the least apparent fear of death. His friends desired him to effect his escape, and, indeed, made arrangements for that purpose which he refused to take advantage of, stating that he had always obeyed the laws and that he always intended to do so; that if he had been dissatisfied with the laws of Athens he should have left when he was at liberty to do so. His conversation in prison forms the theme of Plato's *Phaedo* and of his *Crito* as well. When the time of execution arrived, Socrates, surrounded by weeping friends, took the cup of hemlock poison from an attendant and drank it with the utmost calmness. He then walked up and down his cell until the draught began to take effect, when he lay down on his couch, covered himself calmly with his coat, and expired. "Thus died the man," says Plato, "who, of all with whom we are acquainted, was in death the noblest, in life the wisest and most just." As reported by his followers, Socrates' views of life correspond more nearly to the teachings of Christ than those of any other person whose thoughts have come down to us from antiquity. Although he was a homely, egotistical busy-body, he was pure in heart and fearless—a lover of mankind. His ideas of right and wrong, and fundamentally his notion that right is right and wrong wrong, are forces that still move, and always will move, the world.

See XANTHIPPE; PLATO; XENOPHON; ATHENS.

Soda. See SODIUM.

Sodawater. See WATERS, MINERAL.

Sodium, a widely distributed and well known chemical element. In combination with chlorine it forms common salt. In plant life sodium seems to bear somewhat the same relation to plants on the seashore that potassium does to inland plants, but common salt is not a requisite of plant growth. The stalks and leaves of saline plants store up salt, but their seeds contain little of it. In its pure form sodium resembles potassium in weight and appearance. When laid on water, it acts like it, only not so energetically. Several compounds of sodium are important. Sodium chloride, or salt, has been mentioned. Sodium nitrate is the saltpeter of Chile from which common saltpeter is made. Sodium sulphate, or Glauber's salt, is the medicinal principle of Carlsbad and other mineral waters. Sodium carbonate or soda is essential to the manufacture of glass and of soap. It was obtained formerly from the ashes of sea plants, but processes have been devised for getting a commercial supply from salt. Soda is used in the manufacture of baking powder, in sodawater, and as a medicine. Sodium borate is common

borax. Alkali water is impregnated commonly with sodium. See POTASSIUM; SALT; BORAX.

Sodom, in sacred geography, a city in the vale of Siddim, near the Dead Sea. According to the Scriptural account, Sodom and its sister city, Gomorrah, were destroyed on account of their wickedness in the time of Abraham and Lot. Tradition has it that the site of these cities is covered by the Dead Sea, but geologists say that this is not possible. See DEAD SEA; APPLES OF SODOM.

Soil, the loose surface of the earth in which vegetation takes root. Soil is derived chiefly from rocks, but in part from the water and air. The hardest rock wears off when exposed to the weather. Changes from hot weather to cold and back again crack the surface of rocks. Water enters the slightest crack, and, expanding with frost, pries off fragments, just as it bursts a waterpipe or bulges the bottom of a pail. Lichens send tiny roots into crevices and enlarge them. Flying dust strikes against the face of a rock and chisels off more dust. Sandy water scours out furrows, each sharp grain of sand in suspension acting like a chisel to scrape off tiny stone chips. If water or air or the acids of plant roots are able to dissolve any portion of a rock, the rest is all the more likely to crumble into soil. Soil is chiefly crumbled rock. Some kinds of rocks wear and crumble into sand; others are worn and ground into clay; a third sort of soil is vegetable soil or humus. Humus is formed by the decay of plants. Some soil is almost pure sand. Some is pure clay; and some, like peat and the muck of swamps, is almost purely vegetable. A mixture of sand, clay, and vegetable soil is called a loam. If sand predominates, it is a sandy loam; if clay, a clay loam; if humus, a vegetable or frequently a black loam. Clays and sands are of any color—red, gray, yellow, vermilion, or blue,—according to the color of the rocks from which they come. Soil may be found near the rock from which it is derived, as soil at the foot of a cliff lying next the surface of a stratum of disintegrating limestone; or it may be carried thousands of miles away by streams, dust storms, and ice. The soil at the mouth of a large river has come almost invariably from rocks in the interior of the continent. Mountain chains are worn down, not infrequently a mile or two, and the soil thus made is carried down to build up the lowlands. Glaciers make and transplant enormous quantities of soil. See SAND; LOESS; LAVA.

Soiling, in agriculture, the practice of feeding farm animals green fodder in the stable, instead of pasturing them. Cropping is another term for the same method. The practice was brought to the notice of Americans as early as 1820 by Josiah Quincy, an intelligent agriculturist of Massachusetts. He got his ideas from Europe. Soiling is applicable particularly to a dairy farm. There are several advantages. When cows are kept in a barn it is necessary to fence only a small pen, for exercise; the cows are sheltered from the rain and from annoying insects; there is no waste of feed through trampling; the manure can all be saved and applied where it is needed; two or three times as much feed can be raised on the same amount of land; and, far from seeming to suffer from confinement, stock actually does better. Fattening animals gain in weight more rapidly, and dairy cows give a much greater flow of milk. By soiling and keeping a small farm in a high state of fertility, it can be made to yield much greater profit than a larger one can under ordinary systems of farming. In the *Year Book* of the Department of Agriculture for 1903, Mr. Spillman tells of a fifteen acre farm in southeastern Pennsylvania. Two acres are occupied by buildings and yards. The remaining thirteen acres raise all the forage needed for thirty head of stock, seventeen of which are dairy cows. The crops grown are rye, timothy, clover, corn, peas, oats, and millet. Two crops a year are raised in some of the fields. The animals are kept in stalls; the manure is carted to the fields daily. In addition to green feed raised on the farm, grain is bought with a part of the proceeds from the cows. One man and a boy have done the work and have over $1,000 a year to show for their labor.

Sol. See HELIOS.

Solar System. See SUN.

Solder, sŏd′ẽr, an alloy used to join metals. It is a sort of metal paste or muci-

lage. Soft solder is a mixture of lead and tin. It is melted and applied with a hot soldering iron, and hardens almost instantly. Hard solder, usually of zinc and copper, is not so easily melted, but is firmer.

Soldiers' Homes, institutions in which aged and disabled soldiers are housed and cared for. A national home has been provided for disabled volunteer soldiers, with branches at Dayton, Ohio; Milwaukee, Wisconsin; Togus, Maine; Hampton, Virginia; Leavenworth, Kansas; Santa Monica, California; Marion, Indiana; Danville, Illinois; Johnson City, Tennessee; and Hot Springs, South Dakota. The aggregate number of members cared for is about 35,000. The requirements for admission are as follows:

1. An honorable discharge from the United States service during a war in which it was engaged.
2. Disability which prevents the applicant from earning his living by labor.
3. Applicants for admission will be required to stipulate and agree to abide by all the rules and regulations made by the board of managers, or by its order; to perform all duties required of them and to obey all the lawful orders of the officers of the home. Attention is called to the fact that by the law establishing the home the members are made subject to the rules and articles of war, and will be governed thereby in the same manner as if they were in the army of the United States.
4. A soldier or sailor must forward with his application for admission his discharge paper, and when he is a pensioner, his pension certificate, which papers will be retained at the branch to which the applicant is admitted, to be kept there for him, and returned to him when he is discharged. This rule is adopted to prevent the loss of such papers and certificates, and to hinder fraudulent practices; and no application will be considered unless these papers are sent with it. If the original discharge does not exist, a copy of discharge, certified by the war or navy department, or by the adjutant-general of the state, must accompany the application.

A home for soldiers of the regular army has been established at Washington, District of Columbia. All soldiers who have served twenty years as enlisted men in the regular army, including volunteer soldiers, and all soldiers of less than twenty years' service who have incurred such disability by wounds, disease, or injuries in the line of duty while in the regular army as unfits them for further service, are entitled to the benefits of this home. Inmates are subject to the rules and articles of war, the same as soldiers in the army. They are comfortably lodged, fed, and clothed, and receive medical attendance and medicine. About 1,300 men are receiving the benefit of the home.

The veterans of the Civil War in the South, while the sacrifices they made in what they believed to be a patriotic cause, were not less than those of the veterans of the North, and while they are not less worthy or respectable than their brothers who wore the blue, are, of course, not eligible for admission to national soldiers' homes. Nor do they receive pensions from a grateful country. The Southern States, mindful of the heroism of the "boys in gray," have in some sort provided homes for those of them who are destitute, and the governments of the different commonwealths make it a point, when there are places which they can fill, to appoint Confederate veterans to public positions.

Sole, a salt water fish of the flatfish type; for which see TURBOT. Ten to twenty inches long. Weight, one to ten pounds. It frequents sandy shores in search of shellfish, and is taken by a trawl net dragged over the bottom of the sea. The sole season lasts from early spring till autumn. The markets of Paris and London receive immense quantities. Billingsgate market, London, disposes of 75,000 to 100,000 bushels of soles a year.

Solid, as distinguished from liquids and gases, one of the three states of matter. A solid tends to retain its shape. A piece of wood, iron, or stone, however small, is a solid. Under the influence of heat and chemical action, all known solids may be changed into liquids and gases. Under pressure and the withdrawal of heat, most if not all gases have been reduced to liquids and solids. Freshly made putty, butter, and cheese are soft solids, while steel and granite are hard solids. See HARDNESS.

MATHEMATICS. In mathematics the term is used to define a magnitude having three dimensions — length, breadth and thickness. Any particular solid takes its name from its shape, a cube, cone, sphere. The volume of a solid is expressed in solid or cubic units and is equal to the product of its length, breadth and thickness. The product is entered in terms of cubic feet.

Solitaire, sŏl-ĭ-târ′, a name given to any game that may be played by one person. In reality, a game of solitaire is in the form of a puzzle. A number of card games go by the name. A favorite game of solitaire is played with a board furnished with holes and pegs so arranged as to form a slight modification of the fox and goose board. The central hole is left vacant. Pegs are placed in all the holes but the one in the center. Any peg should be removed from the board by causing a peg behind it to leap over into a vacant hole in front. The movements may be up or down, or crosswise, but not diagonally. The game consists in removing all the pegs from the board but one. The last peg must occupy the central hole. In some games the exercise of skill and judgment is necessary but in most they depend entirely upon luck. See GAMES.

Solomon (1033-977 B. C.), a king of Israel. He was the son of David and Bathsheba. His father preferred him to his elder brothers and appointed him to rule in his stead. The kingdom of Israel reached its greatest pitch of glory during the rule of Solomon. After the fashion of the kings of Babylonia and Assyria, he subdued surrounding nations and levied tribute. With the wealth thus acquired, he upbuilt and adorned the city of Jerusalem. Under the influence of wealth the Hebrew forms of worship took on a degree of display and magnificence previously unknown. He built the temple at Jerusalem and fortified the city. In many cases Solomon imitated the voluptuousness of foreign courts. He maintained a large harem and many foreign wives through whom idolatrous forms of worship crept into the Holy City. At his death, the kingdom was divided. The Old Testament books of Proverbs, Ecclesiastes, and the Song of Solomon are attributed to him, but critics regard his claim to authorship as very doubtful. Certainly, a large part of the book of Proverbs was written by others. See JERUSALEM; JEWS; DAVID.

Solomon Islands, a group of islands in the Pacific Ocean, east of New Guinea. The islands are so numerous as to constitute an archipelago. The surface is mountainous and volcanic. The total area of the islands is about 12,500 square miles. About one-third of this area was claimed by Germany until 1914, but all is now under British protectorate. There are in all about 200,000 natives, noted formerly for cannibalism. There are plantations of cocoa trees, sweet potatoes, bananas, and coffee. The exports are copra, pearl shell, and ivory nuts to the value of possibly $250,000 a year.

Solomon's Seal, a plant of the lily family common in hardwood copses. The overground portion has a slender, tough stem carrying broad, sessile, lanceolate, parallel-veined leaves. The latter are arranged closely in two ranks, one on either side of the stem. Stem and leaves bend in graceful, plume-like fashion. Pairs of small, greenish, bell-like flowers hang from the axes of the leaves. They are succeeded in late summer by dark blue spherical berries covered with a bloom like a blueberry. The annual portion of the plants springs up from a white root-stock. Each autumn the stem of the year falls off, leaving a circular scar on the root-stock, whence the name Solomon's seal. False Solomon's seal is a more common plant belonging to the same family. It is more slender, with narrower and smaller leaves. Its starry white flowers are clustered in panicles at the ends of drooping stems. The berries are red. The root-stock is without the characteristic scar.

Solon (about 640-559 B. C.), an Athenian lawgiver. He was of noble ancestry. When a young man he engaged in trading and traveled extensively. As compared with the Babylonians and Egyptians, the Greeks were then considered a western, rude nation. In Egypt a priest is said to have addressed him: "O Solon, Solon! you Greeks are mere children; there is no old opinion handed down among you by ancient tradition, nor any signs hoary with age." Solon collected a fund of information about other countries, customs, and government. He was reckoned one of the seven wise men of Greece. He also acquired note as a poet and a soldier. About 594 B. C., during a period of severe strife, he was elected archon and was intrusted with the revision of the severe laws of Draco. He instituted a series of reforms, the chief of which may be mentioned. He made the farmers owners

of the soil, and freed them from heavy rates paid previously to aristocratic landlords. Certain classes of debts were canceled. All Athenians in slavery were set free, and laws were enacted forbidding the further enslavement of Athenian citizens. The quantity of land that might be held by a single owner was limited. For many years these reforms were celebrated by an early "Festival of the Shaking-off of Burdens." Solon also introduced changes in the government that resulted in making Athens a democracy. By taking away the lands of aristocratic owners, he reduced their powers and gave the industrious merchant an increased opportunity for influence. He established a senate of four hundred, thus practically supplanting the Areopagus. The common people of the Attic tribes (not helots or outlanders) were admitted to a vote in the assembly. He caused his laws to be inscribed on wooden cylinders and tablets and set up in public. Solon's reforms are to be regarded as one of the great steps in the conversion of the Athenian aristocracy into a democratic form of government. Solon's own judgment on his work was that his laws were not the best conceivable, but that they were the best that the people could be induced at that time to accept. His predecessor in law-making was Draco; his successor was Clisthenes. See CROESUS.

Solstices, sŏl′stĭs-es (sun standing), the stationary points in the sun's northern and southern courses. In spring, as the days increase in length, the sun seems to pass higher in the heavens each day. The day on which the summer sun reaches its highest midday point is the summer solstice. It occurs on or about the 21st of June and is the longest day of the year. For the following six months the midday point of the sun is farther and farther down the sky. The day on which the sun hangs lowest at midday in the northern hemisphere, or midwinter, is the day on which the midday position of the sun is highest in the southern hemisphere; that is to say, our winter solstice is the summer solstice south of the equator. See SEASONS.

Solution, a homogeneous liquid formed by dissolving a solid or a gas in a liquid, or a liquid in another liquid. The liquid which dissolves is known as a solvent, and the substance dissolved is the solute. A solid substance may or may not undergo chemical change upon solution. Water is the most common solvent, but it does not dissolve oily liquids. Under natural conditions the dissolved substance becomes uniformly distributed in the solvent. Heat, which diminishes cohesion, is generally conducive to rapid solution, and in the case of gases, pressure facilitates the dissolving process while with the removal of the pressure effervescence occurs, and the gas passes out of solution. Saturation takes place when the forces of adhesion and cohesion balance each other, that is, when solids mix with solvents in only certain proportions, and when at a certain stage no more of the solid will dissolve. In the process of dissolving if small portions of the solid are added from time to time, the first portions dissolve more rapidly than those which are added later.

The process of solution can be explained in a general way by the molecular theory of matter. The inter-molecular attractive forces which hold together the molecules of the solid are neutralized by the superficial molecular layers which are acted upon by the external attractive force of the solvent. As a result, the molecules of the solute begin to escape. Among theories concerning the phenomena of solution, the ionic theory, advanced by Vän't Hoff and Arrhenius, is the most generally accepted. These physicists find that solutions which conduct electrolytically bring about ionization (the dissociation of a solute into small bodies called ions), while in those which do not conduct electricity, electrolytically the dissociation is small or nil. In this way they account for the differing degrees of dissolving power in solvents.

Solway Firth, an arm of the Irish Sea. It extends forty miles inland between Cumberland, England, and the Scottish coast. It narrows nearly to a point, up which the tides rush with great force and upon retiring leave large expanses of bare sand. "Love swells like the Solway, but ebbs like its tide," declared young Lochinvar at the bridal feast. The reader will find a vivid picture of sands, gypsies, fishermen's nets, and smuggling in Scott's *Redgauntlet*.

The country of Carlyle lies on the Scottish side of the inner Solway. Gretna Green, the Mecca of runaway English couples, is the first village on the Scottish side of the border line. See GRETNA GREEN; TIDES.

Solyman I (1490-1566), a sultan of Turkey. He was surnamed "The Magnificent." He was the son of Selim I and became sultan in 1520. The Turkish Empire reached its highest point under Solyman. He captured Belgrade from the Hungarians in 1521, and later carried his victorious arms to the very walls of Vienna. He captured the island of Rhodes from the Knights of St. John, 1522. He also stripped Persia of territory as far as Bagdad and annexed part of Armenia. The Barbary States came under the ruling of Turkey during the reign of Solyman. See TURKEY.

Somaliland, a region occupying the eastern horn of Africa. It extends along the coast from the Strait of Bab-el-Mandeb to the Juba River. The region is arid or semi-arid. The total population is over half a million. It is inhabited by the Somali, a Hamitic people, a dark-skinned branch of the white race. The Somali are mixed with negro blood in the south and with Arab blood in the north. As a consequence there is considerable variation in stature, complexion, and form. Although an interesting people the Somali have no literature. Nominally they are Mohammedans. The Somali are divided into numerous tribes. They are a pastoral folk, rearing herds of camels, cattle, horses, sheep, and goats. Their agriculture is carried on by negro slaves. The Somali are a fighting people. Were they not split into jealous tribes they might have preserved their independence, but, as it is, the region is divided into various protectorates.

Beginning at the south the coast of Somaliland is divided into Italian, British, and French protectorates. The inland part of the Somali country belongs to Abyssinia. The merchants of Great Britain do a considerable business with the British protectorate. Rice, cotton goods, dates, cutlery, and other articles are imported to the value of $1,000,000 a year. Skins, hides, ostrich feathers, gum, cattle, and sheep are exported. Inland transportation is carried on entirely by means of caravans.

Somnambulism, walking while asleep. See SLEEP.

Somnus, in Greek mythology, the god of sleep. He was the son of Nox, Night, and was twin brother to Mors, or Death. He dwelt in a dark cave in the far west. Poppies and other herbs grew about the door, from which Night pressed slumber-giving juices for mankind. Somnus slept on an ebony couch surrounded by black drapery. Only the most urgent message from the gods could rouse him so far as to rest on one elbow. Having given his son and messenger, Morpheus, the desired command to visit some mortal, the god lay back drowsily and composed himself anew to sleep. This is the account given by Ovid. Other poets represent Somnus as a young man. In art, he is a graybeard, or again a youth bearing a wreath of poppies or else a horn in which he carries dreams. See SLEEP; DREAMS; POPPY, etc.

Song of Roland. See CHANSON DE ROLAND.

Song of the Shirt. See HOOD, THOMAS.

Sonnet, a lyric poem dealing with some single idea, or single phase of sentiment expressed in a single stanza of prescribed form. The sonnet originated with Petrarch, an Italian poet of the fourteenth century. The first sonnets in the English language were written by Thomas Wyatt, an English poet of the sixteenth century much employed by Henry VIII on foreign embassies. He had a friend and imitator in the poet Surrey. The sonnet consists of fourteen iambic pentameter lines. Milton's sonnet *On His Blindness* is a fine example of this form of poetry and will serve to show the usual arrangement of rhymes.

Poets vary the arrangement of rhymes slightly, especially in the last six lines, where the order c d e c d e is very common. In a perfect sonnet, the emotional feeling or sentiment increases through the first eight lines, or octave as they are called, and subsides through the last six lines or sextet, reaching the climax in the eighth line. The sonnet has sometimes been called the "wave of flow and ebb." Shakespeare, Milton, Keats, Wordsworth, Mrs.

Browning, and many other poets have written beautiful sonnets. Mrs. Browning's *Sonnets from the Portuguese* are among the finest examples. See POETRY; LYRIC; WYATT.

Sonometer, an instrument for determining the laws of sounding strings. It consists usually of two or more piano wires of known weight, stretched over a sounding box, with devices, usually weights, for increasing their tension. The laws of sounding strings are very interesting:

1. The heavier the string, the lower the tone.

2. If two strings have the same length and size, but carrying unequal weights, the tighter string will give the higher note.

3. The shorter the string, the higher the note.

Tuning a piano consists in giving each wire its proper tension, so that it will vibrate with desired frequency and produce the tone expected from it.

See VIOLIN; PIANO; SOUND.

Sons of Veterans, a patriotic association designed to perpetuate the traditions of the Grand Army of the Republic. The first camp was organized in Philadelphia, September 29, 1879. The organization is composed of lineal descendants, over eighteen years of age, of honorably discharged soldiers, sailors, or marines who served in the late Civil War. There are now about one thousand camps, with a membership of fifty thousand, distributed among twenty-five divisions, corresponding to states, the general society or national body constituting the commandery-in-chief. Each camp has its own officers, the head officer being the commander. The principal officer of the division is the division commander. The Sons of Veterans' Auxiliary is an association of women auxiliary to the organization.

Soot. See CHARCOAL.

Soothing Syrup. See NARCOTIC.

Sophists, sŏf′ĭsts, public teachers in ancient Greece during the fifth and fourth centuries B. C. They taught for pay. They incurred the dislike of those who could not afford to pay them, and also of those philosophers who thought that teaching ought not to be done for pay. They filled a need. Many wealthy Athenians desired teachers for their sons. The sophists acquired an unenviable reputation for unsound argument to which the name sophistry is still applied. The word sophist really means a teacher of wisdom.

Sophocles, sŏf′o-kleez (about 495-406 B. C.), one of the three great tragic poets of Greece. Aeschylus and Euripides are the others. Little save tradition is known of his early life except that his father was an artisan and lived in an aristocratic quarter of Athens. Sophocles ranks next to Aeschylus as a tragedian, and some critics place him before Aeschylus. His greatest tragedies are *Oedipus Tyrannus, Oedipus at Colonus, Antigone, Electra, Philoctetes, Ajax,* and *Maidens of Trachis.* He is said to have won a score of tragic victories. In all his contests for prizes, he ranked either first or second, never once third. Only seven of his tragedies have been preserved. His plays are considered the most perfect of all dramas. From a habit of borrowing freely and gracefully from other authors, he has been nicknamed the "Attic Bee."

Sorbonne, sôr-bon′, a famous school of theology situated in the Latin quarter of Paris. It was a part of the University of Paris. It was founded in the thirteenth century by permission of Pope Alexander IV. It was intended originally for the instruction of poor students who were unable to pay for tuition in the ordinary way. In time the faculty became noted not only for piety but for learning. Theological questions were submitted to the faculty of the Sorbonne for settlement. The first printing press in France was set up within its walls. During the period of the Reformation, the Sorbonne was the French center of Catholic thought and activity. Many of the woes of the Huguenots emanated from it. It was strongly opposed to the Jesuit Society. In the eighteenth century it came into conflict with the French scholars who compiled the famous encyclopedia, and was the frequent subject of their biting, not to say scurrilous, wit. The Sorbonne was suppressed by the French Revolution and its property taken for public purposes. In 1808 the site, buildings, and property were given by Napoleon to the newly organized University of France. Numerous new buildings have been erected. The old have

almost disappeared, with the exception of an old church in which the tomb of Richelieu finds shelter.

Sorel, Quebec, is situated on the Richelieu River at the point of junction with the St. Lawrence, and on the Quebec, Montreal & Southern Railway, 42 miles northeast of Montreal. The city has a large water trade in coal, ore, pulp wood and grain. There are manufactories of agricultural machinery, wood pulp, plumbers' supplies, wines, sash and doors, brooms, foundry products and clothing.

Sorel has good public schools, Saint Bernard College and a number of churches. The water works are municipal property.

The city was incorporated in 1889, and in 1921 had 8,174 residents.

Sorghum, sôr′gŭm, a sort of cane, closely related to broom corn. It is a member of the corn or grass family. The American varieties are from China or Africa. In the North sorghum is not infrequently called "sugar-cane," which it resembles in growth, stalk, and leaves. Sorghum, however, bears a fine pyramidal panicle of rich seed; sugar-cane has none. It is raised extensively in some localities for sorghum molasses. The cane is stripped (deprived of leaves), cut and topped, care being taken to keep the fresh, bleeding ends out of the dirt. It is put through a roller press not unlike a laundry clothes press in principle. The sap is caught in a trough and is conveyed to a series of vats where it is cleared and evaporated to the desired thickness. Fresh sorghum, especially of the variety known as amber, is an acceptable addition to table fare. Sorghum is an annual raised from seed. Cut young it makes excellent forage. See SUGAR-CANE; BROOM CORN; KAFFIR CORN.

Sothern, Edward Hugh (1859-), a famous American actor of Shakespearean roles. He was born at New Orleans, La., the son of an actor. His father objected to the boy's following a theatrical career, and took him abroad to study painting. But in 1879 Mr. Sothern discontinued art study, returning to America, and in 1881 toured the country as a comic actor. His real success came in 1885, when he secured the leading part in *One of Our Girls,* given at the Lyceum Theater, New York. In the ten years following, Mr. Sothern was successful in such plays as *If I Were King, The Highest Bidder, The Three Musketeers* and *The Adventures of Lady Ursula.* In 1900 he appeared in the title role of *Hamlet,* and in 1904 began his association with Julia Marlowe, whom he married in 1911. Besides the plays of Shakespeare, Mr. Sothern has met with success in *The Prisoner of Zenda, John the Baptist, The Fool Hath Said, Joan of Arc,* and many others as well known. In Mr. Sothern's autobiography, *The Melancholy Tale of Me,* is found an interesting record of his struggle for fame upon the stage.

Soult, Nicolas (1769-1851), a distinguished French marshal. He entered the French army in 1785. He was made marshal of France in 1804. He served with distinction in the battles of Austerlitz, Jena, and Eylau. He blockaded Sir John Moore in Corunna. He was opposed by Wellington, 1813-14. In 1827 he was made a peer. As ambassador extraordinary he attended the coronation of Queen Victoria in 1838. He closed his political career as minister of war.

Sound, as usually understood, a vibration or jar of the atmosphere which sets in motion an inner membrane of the ear and causes a sensation to pass along the auditory nerves to the brain. All sound originates in a quick, short movement of some sounding body, as a piano string, the lip of a bell, the vibrations of the edges of one's throat, that is to say, the vocal chords, the fluttering of a leaf, in short of any material substance capable of conveying a jar to the air. In conveying sound the air strikes the membrane of the ear as a pulse or jar, not as a current. Sound may be conveyed by any elastic substance, like wood. For instance, a watch may be laid on a table and its sound smothered by a pillow until it cannot be heard in a room. If the experimenter will then place his ear at the wood at the farther end of the table, he can hear the ticking of the watch distinctly.

Some substances convey sounds very much more rapidly than others. Sound travels through free air, not freezing air, at about 1,091 feet per second. Moist air carries sound faster than dry air; warm air faster than cold air. The loudness of sound

varies inversely as the square of the distance. Doubling the distance gives one-fourth as great intensity. Trebling the distance gives an intensity one-ninth as great. Sound travels in all directions from a sounding body, and is heard naturally in a space the shape of a globe. If, however, the air be confined, as by a speaking tube, so that the energy travels chiefly in one direction, one's voice may be heard much more distinctly.

If sound pulses reach the ear with sufficient frequency and with regularity, the sound is changed from a mere noise into a musical note.

Two hundred and sixty-four beats per second, for instance, give a note called middle C. Twice as many, or 528 beats per second, give an octave above, and twice as many again, or 1,056, give a note called upper C. To say that one note is lower than another is another way of saying that it is made by fewer beats per second. A note is in harmony with another note produced by twice as many or but half as many vibrations per second, or with any other note whose number of beats bears a simple arithmetical relation to its own number, so that the beats come together at frequent and regular intervals. A note taken as a basis is called a fundamental. Any note is in harmony with the fundamental whose vibrations are made by two, three, or any number of times the number of vibrations made by its fundamental. The greater the number of vibrations per second, the higher the pitch. Sound has not only intensity and pitch, but quality or timbre. The same notes struck by different bells differ in quality. It is an indescribable richness or the want of it to which the term timbre is applied.

See SONOMETER; PITCH; PIANO; SPEAKING TRUMPET; ECHO; VIOLIN; ORCHESTRA.

Sounding. See CHALLENGER EXPEDITION.

Sousa, sōō'za, **John Philip** (1854-), an American composer and bandmaster. He was born in Washington, District of Columbia. His musical ability was so pronounced that he became leader of a band at the early age of seventeen. He was instrumental in the organization of the famous United States Marine Corps Band, and was its leader, 1880-92. Under his management the band made several concert tours in the larger European cities and won no little reputation for American band music. When the United States entered the World War, Sousa organized the bands at the Great Lakes Naval Station. See THOMAS, THEODORE; ORCHESTRA.

South America. See AMERICA.

Southampton, an important port on the southern coast of England. It lies at the head of Southampton Bay. In amount of tonnage Southampton is the sixth port in the United Kingdom. It is the home port of several lines of steamships. It corresponds on the British coast to Havre on the French coast. The heavy freights between London and Paris are transported usually by this route. Southampton is also a port of call for the North German Lloyd line of steamships. Southampton is an ancient town. The Romans are supposed to have made a landing here. Richard the Lion-Hearted embarked here for the Third Crusade. More than one English Armada destined for descent on France set sail from Southampton. The Mayflower, the ship of the Pilgrim Fathers, set sail, it may be remembered, from Southampton in 1620.

South Bend, Indiana, an industrial city and the county seat of Saint Joseph County, is 86 miles southeast of Chicago, on the Saint Joseph River, and the Grand Trunk, Michigan Central, New York Central and several other railroads. It is connected by interurban lines with many other Indiana and Michigan cities. The site of South Bend was once the home of Miami and, later, Potawatami Indians. In 1824 a trading post was established here by Alexis Coquillard. It was not until 1831 that the town was laid out, but the town soon became a city. South Bend is the home of two internationally famous industrial establishments—the Oliver Plow Company and the Studebaker Wagon Works. Automobiles, woolens, flour, sewing machines, clover hullers, cutlery, concrete mixers, mattresses, cigars, candy, furniture, lumber, watches, lathes, harness, varnish, electrical appliances, foundry and machine shop products, and numerous other commodities are also produced here.

Notable among the educational institutions of South Bend are the University of Notre Dame, St. Joseph's Academy, St. Mary's Academy, and the Northern Indiana Medical and Surgical Institute. The public schools are very modern, and are supplemented by fine libraries. The Federal building, courthouse, post office, public hospitals and public parks are all objects of interest. South Bend in 1920 had a population of 70,983.

South Carolina, the smallest of the South Atlantic states, is popularly known as "The Palmetto State," from the palmetto tree, which grows here in abundance. It is one of the original thirteen states of the American Union. South Carolina has an area of 30,989 square miles, in this respect ranking thirty-ninth among the states. It is roughly triangular in shape, and is bounded by North Carolina on the north and northeast; by the Atlantic Ocean on the southeast; and by Georgia on the southwest and west.

THE PEOPLE. In 1920 South Carolina had 1,683,724 inhabitants, standing twenty-sixth among the states. The Negro population was 864,719 in this year, comprising about 51 per cent of the total. Only 6,401 South Carolina residents were foreign born; this was the smallest foreign born population in any state. South Carolina's people are 17.5 per cent urban, and are distributed in the proportion of 55.2 to a square mile. The largest city is Charleston, with a population of 67,957. Three other cities—Columbia, Greenville and Spartanburg — have a population of more than 20,000, and two—Florence and Anderson—of more than 10,000.

SURFACE AND DRAINAGE. The slope of the state is from the northwest to the southeast, and all the important rivers flow into the Atlantic. There are two distinct topographic regions—the coastal plain and the piedmont region. About two-thirds of the way inland is the line that separates these two areas. It is a fall line formed by an old sea shore that parallels the present shore. The outer edge of the coastal plain is low, flat and marshy. Inland for the first 100 miles this plain rises more sharply to an elevation of 500 feet. Thence to the western border the rise is gradual, but in the extreme west and northwest a height of 2,000 feet is reached. This is the Blue Ridge Mountain wall, and from this range rises the highest peak in the state —Rich Mountain, 3,569 feet high. From north to south the principal rivers are the Waccamaw, Lumber, Pee Dee, Lynches (a Pee Dee affluent), Wateree, Congaree Edisto, Combahee and Savannah. The Broad and Saluda rivers unite to form the Congaree, and this unites with the Wateree to form the Santee. The Georgia-South Carolina boundary is formed by the Savannah. At the fall line these rivers descend sharply into the coastal plain, and at this point they are valuable power generators. They flow slowly across the coastal plain; the tide comes up for an average of 20 miles and overflows into the rice fields of the coast sections.

CLIMATE. The climate of South Carolina is often compared with that of southern Italy. The swampy southern shores are malarial and unhealthful, but farther inland the climate is as salubrious as can be found anywhere in the United States. The mean annual temperature is 62.5° F., and the annual rainfall is 45 inches.

MINERALS. South Carolina's minerals are varied but not extensive. First in importance is clay; next is phosphate rock, containing about 55 per cent of phosphate lime. Granite and mica are quarried, and gold, silver and copper are mined in small quantities. Small deposits of marble, graphite, bismuth, limestone, talc and fuller's earth are also found.

AGRICULTURE. All temperate zone and several subtropical crops thrive in the state, which had more than 6,000,000 acres of improved farm land at the last agricultural census. The most valuable crop is cotton, in the production of which the state ranked sixth in 1921. Tobacco, corn and peanuts are raised in valuable quantities, and are followed by sweet potatoes, potatoes, wheat, rice, hay, oats, sugar cane, peaches, pears and apples. In the southeast figs, oranges and lemons are grown in small quantities.

More than 60 per cent of the state is forested, the principal stands of timber being cypress and yellow pine. Lumber from these forests, and rosin, turpentine

and tar are the most important forest products.

MANUFACTURE. By the last industrial census South Carolina had 2,004 manufacturing establishments capitalized at $374,537,636. The most important single industry is engaged in cotton weaving; the number of spindles operating exceeds 5,000,000 annually.

The cotton mill product comprises more than half the total of manufactures. Cottonseed oil and cake, phosphate fertilizers and lumber products are next in importance.

TRANSPORTATION. South Carolina has 3,804 miles of railroads and almost all of the larger rivers are navigable to the fall line, that is, from 90 to 125 miles. The principal railroads are the Seaboard Air Line, Atlantic Coast Line, Charleston & Western Carolina, Southern and Carolina, Atlantic & Western. The chief ports are Charleston and Georgetown, and these and Beaufort are ports of entry.

INSTITUTIONS. Since 1920 the charitable and correctional institutions have been in the charge of a state board of public welfare. The institutions include the prison, State Hospital for the Insane, State Tuberculosis Sanitarium, Confederate Infirmary, South Carolina Industrial Schools for boys and girls, Reformatory for Negro Boys and State School for the Deaf, Dumb, Blind, and state training school for the feeble-minded. There are numerous private hospitals and charitable institutions.

EDUCATION. School attendance is compulsory, and there are certain restrictions on the employment of illiterate children. South Carolina has the second largest number of illiterates in the Union, 18.1 per cent of the total population. Separate schools for white and colored students are maintained. In 1920 there were 14,824 public graded and 13 public high schools, and a normal school. The University of South Carolina is a state institution. Other state institutions of higher learning are Clemson Agricultural College, Winthrop College, the South Carolina College for Women and the Normal Industrial, Agricultural and Mechanic College for the Colored. The remaining institutions of importance are Wofford College, Newberry College, Erskine College, Charleston City College and Allen University.

The University of South Carolina, at Columbia, was chartered in 1801 and opened in 1805 under the name of the College of South Carolina. Until the Civil War the college advanced steadily in size and importance, but during that conflict it was converted into a hospital, first for the Confederates and later for the Unionists. It was reopened as soon as the war closed, but financial conditions forced it to suspend again until 1880. In that year it was again opened as a college, but was organized as the University of South Carolina seven years later. The university is organized into colleges of arts and sciences, law, engineering, a school for teachers and a graduate school. Extension courses are also conducted.

GOVERNMENT. South Carolina is governed under the constitution of 1895, the sixth it has had. Provision is made for a bi-cameral legislature; members of the upper house are elected for four years and members of the lower house for two years.

Executive power is vested in the governor, lieutenant-governor, secretary of state, attorney-general, comptroller-general, adjutant, treasurer, inspector-general and state superintendent of education, all elected for two years.

The judiciary consists of a supreme court of one chief justice and four associate justices, circuit courts, courts of common pleas and general sessions.

HISTORY. The territory that is now South Carolina was explored in 1520 by Spaniards from Cuba, and in 1562 the French established themselves at Port Royal. They soon left, however, and not until 100 years late, when Charles II of England claimed this land on the basis of Cabot's discoveries, was a permanent settlement made. This was at Charleston in 1670. Charles granted the Carolinas and territory as far west as the Pacific to a company of eight land proprietors, and between these and the early settlers there was constant conflict. The proprietors were overthrown in 1719.

A crown governor was appointed, but the independent-spirited people were not

satisfied to be thus ruled; delegates were sent to the Stamp Act and Continental congresses; and in May, 1776, the colonists declared their independence of England. The colony was one of England's bitterest foes during the Revolution, and a number of important battles was fought on South Carolina soil. In 1788 the colony was admitted as the eighth state of the Union.

The state, however, was the champion of slavery, and was the first to secede. The first battle of the Civil War was fought at Fort Sumter (see SUMTER, FORT). During the struggle the state suffered severely, and the reconstruction period was chaotic. But in 1868 the state was reorganized and readmitted to the Union. From this year onward South Carolina made rapid progress.

STATISTICS. The following are the latest statistics to be had from trustworthy sources:

Land area, square miles	30,495
Water area, square miles	494
Forest area, acres	10,500,000
Population (1920)	1,683,724
White	818,538
Negro	864,719
Foreign born	6,401
Chief Cities:	
Charleston	67,957
Columbia	37,524
Greenville	23,127
Spartanburg	22,638
Number of counties	46
Members of state senate	47
Members of house of representatives	124
Salary of governor	$3,000
Representatives in Congress	9
Assessed valuation of property	$405,858,970
Bonded indebtedness	$5,382,059
Farm area, acres	12,461,945
Improved land, acres	6,206,644
Cotton, bales (500 lbs.)	760,000
Corn, bushels	32,959,000
Oats, bushels	8,112,000
Sweet potatoes, bushels	7,885,000
Potatoes, bushels	2,550,000
Wheat, bushels	1,298,000
Tobacco, pounds	50,400,000
Peanuts, pounds	33,250,000
Rice, bushels	175,000
Hay, tons	366,000
Sorghum syrup, gallons	1,890,000
Wool, pounds	103,000
Domestic Animals:	
Horses	79,000
Mules	217,000
Milk cows	215,000
Other cattle	254,000
Sheep	26,000
Swine	1,099,000
Manufacturing establishments	2,004
Capital invested	$374,537,636
Operatives	79,450
Raw material used	$227,986,384
Output of manufactures	$381,452,984
Miles of railway	3,804
Teachers in public schools	10,814
Pupils enrolled	479,309

South Dakota, one of the west north central states, popularly known as "The Sunshine State," is bounded on the north by North Dakota; on the east by Minnesota and Iowa; on the south by Nebraska; and on the west by Wyoming and Montana. The Red River, and Traverse and Bigstone lakes, form a part of the South Dakota-Minnesota boundary; the Big Sioux River separates the state from Iowa; and in the southeast the South Dakota-Nebraska boundary is formed by the Missouri River. South Dakota has an area of 77,615 square miles and is fourteenth among the states.

THE PEOPLE. In 1920 the inhabitants numbered 636,547, or only 8.3 to a square mile; thus the state is thirty-seventh in point of population. About one-seventh of the people are foreign born, Scandinavians and Russians predominating. The people are 16.0 per cent urban. Sioux Falls, the largest city, has slightly more than 25,000 inhabitants, while the next largest city, Aberdeen, has only 14,537. These are the only cities whose inhabitants exceed 10,000 and only six others have more than 5,000. The capital, Pierre, had a population of 3,209 in 1920.

SURFACE AND DRAINAGE. The greater part of South Dakota is a vast rolling prairie; the greatest elevation is in the southwest and the lowest point is in the northeast. At Bigstone Lake, in the northeastern corner of the state, the land is 970 feet above sea level. From this point the prairies rise toward the west and southwest. Along the White River, in the southwest, are the famous Bad Lands, a region of mounds, peaks, columns and ridges of wind-carved, eroded, many-colored clay. This weird labyrinth is for the most part without grass, shrub or tree, and at all seasons of the year is worth traveling far to see. Still farther westward are the Black Hills, South Dakota's forest and mining region.

In this region is located the South Dakota State Park, in which are operated two hotels, the state lodge, in the heart of the Park and the Sylvan Lake Hotel. The State Park embraces an area of 90,000 acres and is well stocked with all kinds of wild game. The scenery of this part of the state is remarkable; forested hills, naked, sharp peaks, lakes, swift streams, upland prairies and numerous large and small caves are to be seen here. Near the Wyoming state line is Harney Peak, more than 7,200 feet high.

The great river of the state is the Missouri; it enters from North Dakota in the center of the state line and after flowing a short distance southward is met by the Grand, coming from the west. Lower down the Owl River flows into the Missouri from the west, and still farther south the Cheyenne enters. From the Cheyenne-Missouri confluence the latter swings southeastward to the Nebraska border, receiving another eastward-flowing stream, the White River, before the state line is reached. On the Nebraska line the Missouri flows for some distance nearly due east. To the east of Yankton it is met by the James River, which also comes down from North Dakota, and farther to the east receives the waters of the Big Sioux. The Big Sioux-Missouri junction marks the extreme southeastern corner of the state. Lake Traverse and Bigstone Lake are the largest lakes in South Dakota, though in the eastern part of the state and in the Black Hills there are many others. In the valleys of the Missouri and James rivers are thousands of artesian wells, some of them being notable for their steady flow. Medicinal hot springs are found in the Black Hills, particularly in the neighborhood of the city of Hot Springs, in which is located the magnificent Battle Mountain Sanatarium, officially known as the United States Home for Disabled Soldiers.

Climate. The mean annual temperature is 44° and the average annual rainfall is 20 inches. The northeastern part is coldest, the southwestern warmest. The air is dry; snows are generally light, though there are sometimes high winds and blizzards; and the state is noted for its many days of sunshine.

Minerals. In the Black Hills is found practically every known metal, especially valuable deposits of gold, silver, lead, copper, tin and tungsten; and mica, graphite, iron, limestone, granite and sandstone are also found here. The state ranks fourth in gold production. Quartzite building stone is quarried in the valley of the Big Sioux, and there are in other parts of the state valuable supplies of brick and fire clay and cement rock.

Agriculture is South Dakota's chief source of wealth. The soil is fertile and is estimated ninety per cent arable. More than 19,000,000 acres of the farm land have been improved, and more than 100,000 acres are irrigated. Corn is the largest crop, and is followed by wheat, oats, barley, rye, flax, potatoes and hay. The principal agricultural area is the eastern three-fourths of the state. In the west are 820,000 acres of yellow pine, spruce and other timber. Stock raising, and especially dairying is steadily increasing in importance.

Manufacture. By the last industrial census South Dakota had only 1,414 manufacturing establishments capitalized at $30,933,030 and employing 6,382 persons. Flour and grist milling is the principal industry and the production of milk, cheese, condensed milk and butter is second. Other industries are lumbering and printing.

Transportation. South Dakota has 4,278 miles of railroads, and in certain seasons the Missouri River is navigable for short distances, and the advent of the automobile has spurred the citizens to highway improvement. The principal railroads are the Chicago, Rock Island & Pacific, the Chicago & Northwestern, the Great Northern, the Minneapolis & St. Louis, and the Chicago, Milwaukee & St. Paul.

Institutions. A board of charities and corrections is in charge of the state institutions, which include the prison, State School for Deaf Mutes, State Tuberculosis Sanitarium, State School for the Feeble-Minded, State Insane Asylum, State Reform School and State Soldiers' Home. At Yankton the United States maintains a hospital for insane Indians, and six state Indian reservations are maintained—Pine Ridge, Rosebud, Crow Creek, Lower Brule

River, Cheyenne River and Standing Rock.

EDUCATION. Primary and secondary education is free to all from six to twenty-one years, and primary education is compulsory between the age of eight and sixteen. In 1920 the primary schools numbered 4,749; there were 421 high schools and four state normal schools. At the head of the educational system is the University of South Dakota, and the state also maintains an agricultural college and a school of mines. Other institutions of higher learning are Yankton College, Dakota Wesleyan University and Huron College. Federal Indian schools are maintained at Pierre, Rapid City and Flandreau.

South Dakota expenditures for elementary and secondary education for the year 1920 amounted to $16,248,609.40 or $106.42 for each child enrolled in school.

The University of South Dakota, at Vermilion, was founded in 1882 and was opened in the following year. When South Dakota was admitted to the Union, 1889, a grant of 72 sections of land was made to the university. Courses are offered in arts and sciences, music, law, medicine and engineering. Through the university the state conducts its researches in pure food, drugs, health, geology and natural history. In 1922 the faculty numbered 74 and the student body 1,055.

GOVERNMENT. South Dakota's original constitution, adopted when the state came into the Union, is still used. It provides for a legislature divided into an upper and a lower house, the first to have not less than 25 nor more than 45 members, the second to have not less than 75 nor more than 135 members.

The governor is the chief executive, and other executives are the lieutenant-governor, secretary of state, attorney-general, treasurer, auditor, superintendent of public instruction and commissioner of school and public lands.

The judiciary consists of a supreme court, circuit courts, county courts, and courts of justices of the peace.

HISTORY. The first explorers of the land now included in South Dakota were the members of the Lewis and Clark expedition, 1804-06. A fur trading post was established on the Missouri River at Fort Pierre in 1832, and a few years later this post was bought by the United States government and converted into a military post. A settlement was made at Sioux Falls in 1856, and the valley of the Missouri and other parts of the territory east of that river were soon dotted with settlements.

The territory comprised in the two Dakotas was until 1820 a part of Missouri Territory and the eastern sections of these states later formed parts of Michigan, Wisconsin, Iowa and Minnesota territories. From 1854 to 1861 the western Dakotas were a part of Nebraska Territory, but in the latter year the Territory of Dakota was organized. This included all of North and South Dakota and parts of Wyoming and Montana. The Dakota limits as they are today were defined in 1882, and the territory was divided into north and south sections. These were definitely separated in 1887 and South Dakota was admitted as the fortieth state of the Union in 1889.

Before admission the Sioux Indians, under such famous chiefs as Sitting Bull, Spotted Tail and Red Cloud, had caused the settlers much trouble, but at the Battle of Wounded Knee, 1890, General Nelson A. Miles inflicted the final defeat. Settlers took up more land in the eastern part of the state and soon a steady movement westward began; and after the discovery of the mineral wealth of the Black Hills the future prosperity of the state was assured.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Land area, square miles	76,868
Water area, square miles	747
Forest area, acres	820,000
Irrigated area, acres	100,682
Population (1920)	636,547
White	619,147
Negro	832
Indian	16,384
Foreign born	82,391
Chief Cities:	
Sioux Falls	25,202
Aberdeen	14,537
Watertown	9,400
Mitchell	8,478
Huron	8,302
Rapid City	5,777
Number of counties	63
Members of state senate	45
Members of house of representatives	135
Salary of governor	$3,000

Representatives in Congress	5
Assessed valuation of property	$2,257,853,656
Bonded indebtedness	None
Farm area, acres	34,523,775
Improved land, acres	19,051,922
Corn, bushels	125,632,000
Oats, bushels	58,300,000
Wheat, bushels	25,980,000
Barley, bushels	17,323,000
Potatoes, bushels	4,400,000
Rye, bushels	3,056,000
Flax seed, bushels	1,404,000
Hay, tons	4,158,000
Wool, pounds	4,804,000
Domestic Animals:	
Horses	786,000
Mules	14,000
Milk cows	539,000
Other cattle	1,297,000
Sheep	686,000
Swine	1,525,000
Manufacturing establishments	1,414
Capital invested	$30,933,030
Operatives	6,382
Raw material used	$42,985,870
Output of manufactures	$62,170,782
Gold, value	$4,337,800
Silver, value	$96,234
Miles of railway	4,278
Teachers in public schools	5,891
Pupils enrolled	91,440

Southern Cross, a constellation visible only in the southern hemisphere. It consists of four stars, one of which is of the first magnitude, arranged in the form of a cross. The upper and lower stars form the pointers to the south pole; the right and left ones point directly east and west. Astronomers calculate that six thousand years ago the Southern Cross was visible in England and Germany above the horizon.

Southey (1774-1843), an English poet. He was born at Bristol, the son of a draper of that place. He was educated at Oxford and with Coleridge and Wordsworth formed the trio of Lake Poets. He owned a library of over 14,000 volumes, was a thoroughgoing and methodical reader, and an untiring writer, his works being filled with the results of painstaking research. His writings fill 109 volumes, not including some 150 articles, essays, criticisms, poems, and biographies for current periodicals. In 1813 he succeeded Henry James Pye as poet laureate. He had a democratic, even revolutionary, cast of mind, and was a man of influence, but he has left nothing entitling him to rank as a genius. *The Battle of Blenheim* and the *Cataract of Lodore* are his most popular poems. *Madoc, Thalaba, Roderick, the Last of the Goths,* and *The Curse of Kehama* are long poems, epic in form.

South Sea Bubble, a speculative scheme, originating in England early in the eighteenth century. In 1711 a company of merchants, headed by the Earl of Oxford, agreed to advance the government £10,000,000 to pay off the floating debt. In return the government guaranteed the company six per cent interest on the loan and granted a monopoly of trade in the South Sea. The prospect of profitable trade with Brazil gave the stock of the South Sea Company an enormous market value. Investors were wild to buy shares. Prices of stock rose day by day to fabulous figures. Sixty per cent profits were assured. In 1720 Parliament, by vote of both houses, actually consented to have the company carry the entire national debt of $150,000,000. Stock rose to 890, nearly nine times its face value. Then a crash came. The stock became worthless. Thousands of people were ruined; earls, duchesses, members of the House and high officials were convicted of bribery. Out of the amount owed the company by the government and through the collection of fines, honest investors were paid one-third the face value of their stock.

South Shetland Islands, an Antarctic archipelago, which is a dependency of Great Britain. These islands are situated about 600 miles south of Cape Horn and are separated from Graham's Land and Louis Philippe Land by the Bransfield Strait.

The group consists of twelve islands, the principal ones being George Livingston, Smith, Deception, Clarence and Elephant. The entire area covers about 880 square miles. They were discovered in 1819 by William Smith and charted by George Powell. The islands were at one time the center of a great seal fishing industry, which was carried on to such an extent as to jeopardize it. However, in recent years it brings in millions of dollars annually.

Soviet, the Russian name for *Committee.* The term came into general use after the revolution of 1917, in which the Imperial Government of Russia was overthrown. Soviets sprang into existence all over the country and assumed authority over local administration. These local

soviets, which in turn elect representatives to the district soviets; these, in turn, elect representatives to the province soviet, and the province soviet elects representatives to the state soviet. From the great cities delegates are elected to the All-Russian Convention, which meets not less than twice a year and has supreme authority in the Republic. Each soviet manages the affairs of its particular group and the highest soviet administers the Russian Soviet Republic.

Spa, spä, a town of Belgium noted for mineral springs. It is situated in a beautiful valley of the Ardennes about equally distant from Liege and Aix-la-Chapelle. The town is a center of toy making and other small industries, but is composed largely of hotels, baths, and other accommodations for guests. The springs, several in number, furnish a cool, sparkling water, impregnated with alkaline salts, carbonic acid gas, and a trace of iron. Spa water is celebrated as a remedy for nervousness, dyspepsia, and liver complaints. Immense quantities are bottled for export to all parts of the world. Wooden toys dipped in the water take on a tan color. The term spa is now of general application to mineral springs elsewhere. See WATERS, MINERAL.

Spain, spān, a kingdom of the Old World. Together with the republic of Portugal, it occupies the entire peninsula of southwestern Europe. Meiklejohn likens the shape to a "bull's hide nailed on a board, the neck at Gibraltar." The surface is for the greater part an elevated tableland from 2,000 to 3,000 feet above the sea. The map shows no less than five peculiarly knotted mountain ranges running from east to west. The northern range faces the Bay of Biscay, extends eastward and becomes the Pyrenees, the boundary between France and Spain. The southern range is known as the Sierra Nevada, a name transferred by the Spaniards to our Pacific coast. The five ranges create four interior valleys or upland plains, from which rivers flow eastward to the Mediterranean or westward to the Atlantic. The key to the geography of Spain is the location of these parallel valleys. The chief towns are situated on the chief rivers, or their branches. Saragossa is to be associated with the Ebro; Seville, Cordova, and Granada with the Guadalquiver; Toledo and Madrid with the Tagus; Salamanca, Valladolid, and Segovia with the Douro. The coast is for the greater part bold. The seaports are Barcelona, Valencia, and Malaga on the Mediterranean; and Cadiz, Palos, and Corunna on the Atlantic, each at or above the mouth of a river. There are fever-breeding lagoons of brackish water on some parts of the coast, but the interior, though almost as mountainous as Switzerland, is without lakes of importance. In summertime many of the streams go dry.

MINERALS. The mountains consist of almost all varieties of rock found in Europe,—granite, serpentine, sandstone, limestone, chalk, marl, and gypsum. They are rich in ores of gold, silver, quicksilver, copper, lead, iron, iron pyrites, and zinc. There are also mines of coal. There were in 1920 not less than 3,500 productive mines. The silver mines of Alameda, reputed the oldest in Europe, are sixty miles northwest of Cordova.

TIMBER. Though once well timbered, Spain is now scantily supplied with forests. Except in the coal districts, fuel is scarce and timber for building purposes expensive. The coast towns import coal. The most characteristic trees are the chestnut and cork oak. In the day of archery, Spanish yew was celebrated for bows. The great diversity of surface gives rise to a corresponding variety of plants. Botanists have collected no less than 5,000 flowering species. Many are not found elsewhere. The southern coast has many plants, as date palms, peculiar to Africa. The northern provinces only are cool enough to have grassy meadows and copses like those of north temperate countries. Salt steppe districts are frequent. A considerable area near Granada is covered with esparto grass.

FAUNA. As to wild animals, the ibex and the brown bear are found in the Pyrenees. The fallow deer, porcupine, lynx, Spanish hare, fox, and weasel are characteristic animals still seen occasionally. Spain lies in the route of birds migrating from northern Europe to Africa. Song birds are numerous. Snipes, red-legged partridges, and quails are brought to market in season. Vultures watch for carrion on the plains, and eagles

seek their prey in the mountains. Three-foot lizards and scorpions bask in the sun along the Mediterranean. In the vicinity of Madrid alone, butterfly collectors find 350 species, many of them rare or not found elsewhere. The streams are full of trout. The rivers and harbors abound in food fishes.

AGRICULTURE. In spite of a decided lack of moisture, Spain is an agricultural country. Wheat ranks first as a food plant. Barley is the chief food for horses and mules. Rice and corn are raised in the southeast. Millet and sorghum are raised for forage. Hemp and flax are important crops in some districts. The mulberry tree and the silkworm thrive in the south. Fruit is abundant. Olives, apples, pears, cherries, plums, peaches, apricots, dates, figs, citrons, pomegranates, pineapples, and bananas are raised extensively, according to locality. Grapes grow everywhere. Malaga is the great grape export city of the world. Xeres is noted for sherry wine. Walnuts, chestnuts, and pistachios are abundant.

CLIMATE. The climate of a large part of Spain is surprisingly like that of parts of Mexico and southwestern United States, in which the Spaniards planted colonies. Perhaps no other nation in the world has shown greater skill, industry, and patience in overcoming arid conditions. Irrigation has been managed for centuries. Water is conducted along the mountain sides in canals or across plains in arched aqueducts to water dry districts. As in our Southwest, districts too arid for cultivation are devoted to sheep and cattle raising. The merino sheep originated here. Dairy cattle are found only here and there. The famous animals used for bull-fighting are reared in the southern province of Andalusia. Sheep and goats are the most common domestic animals. There are four times as many mules and asses as horses. They are sure-footed on the mountain roads and stand heat better.

MANUFACTURES. The principal manufactures are cotton, woolen, and silk goods, paper, glass, corks, sugar, wine, and pottery. Although there are 9,020 miles of railway and several well built royal highways in the kingdom, it cannot be said that communication is easy or the carriage of goods inexpensive. Mountain trails and pack trains are still the only means of reaching a considerable portion of the population.

POPULATION. The ancient inhabitants of Spain are represented by the modern Basques. The peninsula filled up with successive waves of Celts, Vandals, Goths, Suevi, Alans, and Visigoths. Spain was, in fact, a sort of land's end,—a pocket in which the migrations spent themselves. Spain was the Land of Tarshish of Scripture. It was the battleground of the Carthaginians, Hannibal and Hamilcar, and the scene of the triumphs of Scipio Africanus. It is said that under the rule of the Roman Empire Spain had a greater population than at any time since. The extent to which it was colonized by Greeks and Romans may be inferred from the birth of Seneca, Martial, Lucan, Quintilian, and other distinguished Latin writers in that province. The remains of Roman works are still a marvel.

HISTORICAL. In 711 Spain was conquered by the Moors (Arabs) of Africa. For eight centuries the Christians were subject to Arab rule—a rule, it must be confessed, far more liberal than that of the Spanish princes. Not only was the Christain religion tolerated, but Cordova, Saragossa, Toledo, Valencia, and Seville, seats of Moslem power, became centers of education and culture that ought to have put the Christians to shame. The Mohammedan universities of Spain attracted students from all Europe and were the most advanced in the western world. However, the contests between Moslem and Christian went on for centuries and afford the most spectacular picture of warfare in the history of the West. The last Moors, and with them the Jews, were not crushed or expelled until after the reign of Ferdinand and Isabella. A large part of the intelligence, industry, and manufacturing skill of the kingdom went with them, a loss from which Spain has never recovered fully.

The Spanish people are naturally proud and haughty. In the sixteenth century they were the predominant political power.

Continental Spain has an area of 190,150 square miles. The population in 1920 was 20,783,844, a gain of 5,000,000 in forty years. The capital and largest city, Mad-

rid, has 608,793 inhabitants. The national church is Catholic. A few thousand Protestants are tolerated on condition that they worship in private. In 1857 a system of public instruction was ordered, and in 1920, 26,108 public schools had been organized. As late as 1889 sixty-eight per cent of the population was unable to read and write. Twenty-five years earlier the rate of illiteracy was eighty per cent. There are eleven universities with 24,500 students. The national coin is the peseta, nominally corresponding to a franc, worth five to a dollar.

Andalusia is one of the most celebrated and characteristic provinces of Spain. It occupies the plain of the Guadalquiver. It is considered one of the granaries of Europe. It contains the ancient cities of Cadiz, Xeres, Seville, Malaga, Cordova, and Granada. It is rich in grain, wines, and fruit. It has mines. The inhabitants are graceful, eloquent, elegant in manner, given to song and dance and picturesque costume, but they are lazy, poor, and happy—quite content to remain so. The siesta or afternoon nap is a regular institution. At that hour the streets and houses are seemingly like those of a city of the dead.

The Spanish language is soft and musical. It resembles the Italian. Three-fifths of the words of the peasantry are Latin; two-fifths are Moorish, Gothic, etc. Of European languages, Spanish ranks next to English in geographical extent.

GOVERNMENT. The government of the kingdom is a constitutional monarchy. Executive power is vested in a king assisted by a responsible ministry. The legislative power is vested in the Cortes composed of a Senate and a Congress equal in authority. Voting is compulsory for all males over twenty-five years of age. The government is maintained chiefly by a direct tax on land, by customs, and by monopoly of tobacco and royalties on ore.

RECENT HISTORY. Spain did not participate in the World War, but her sympathies were with the allies, and Spanish products were shipped to France in great quantities. The country was torn by political and social conflict, however; strikes and riots were frequent, and between 1915 and 1922 the government changed hands several times. The labor unions and the Liberal political element found a basis of agitation in the senseless war waged by Spain in Morocco, and in 1923 the country had not yet reached economic, political or social stability.

STATISTICS. The following statistics are the latest to be had from trustworthy sources:

Area, square miles	190,150
Population	20,783,844
Basque	400,000
Gipsies	50,000
Chief Cities:	
Madrid	608,793
Barcelona	582,240
Valencia	236,447
Sevilla	150,631
Malaga	136,365
Murcia	123,936
Zaragoza	117,742
Cartagena	102,542
Bilboa	98,904
Granada	77,477
Lorca	70,807
Las Palmas	70,233
Valladolid	69,799
Number of provinces	49
Members of senate	360
Members of chamber of deputies	410
National revenue	$395,332,600
Bonded indebtedness	$2,000,000,000
Farm area, acres	29,000,000
Wheat, bushels	143,205,000
Barley, bushels	89,320,000
Oats, bushels	40,035,000
Rye, bushels	28,118,000
Corn, bushels	28,048,000
Flax seed, bushels	52,000
Olives, tons	1,662,384
Grapes, pounds	9,576,528,864
Olive oil, tons	316,963
Wine, gallons	706,756,116
Cane sugar, tons	6,560
Beet sugar, tons	232,700
Domestic Animals:	
Horses	722,183
Mules	1,294,912
Asses	1,137,980
Cattle	3,718,189
Sheep	20,521,677
Goats	4,298,056
Swine	5,151,988
Manufacturing establishments:	
Cotton goods mills	742
Woolen looms	8,800
Paper mills	144
Fish canneries	677
Corks, output in tons	59,073
Anthracite, tons	540.800
Asphalt, tons	4,600
Mercury, tons	19,100
Sulphur, tons	84,700
Zinc, tons	103.400
Copper, tons	937,300
Phosphorite, tons	47,000

Iron, tons	5,244,300
Iron pyrites, tons	782,900
Coal, tons	5,421,800
Lignite, tons	607,600
Lead, tons	193,400
Salt, tons	68,900
Imports	$250,000,000
Exports	$160,000,000
Miles of railway	9,436
Number of schools	31,865
Pupils enrolled	2,628,809

Spaniel. See DOG.

Spanish-American War, a war between Spain and the United States in 1898, arising because of political discontent in Cuba, then subject to Spanish rule. During the early part of the nineteenth century it had been deemed advisable by some to annex Cuba to the United States, but when the slave interests of the South came to an end with the Civil War the matter was dropped. At various times during the last decades of the nineteenth century, Cuba rose in open revolt against Spanish oppression and misrule. From 1868 to 1878 no less than ten efforts had been made to secure independence. In 1895 trouble broke out afresh because of failure on the part of the Spanish government to keep the promises which had pacified the Cubans temporarily. The United States had watched this chronic strife and oppression until the consensus of public opinion favored interference.

Early in 1898 the American battleship Maine was dispatched to Havana in the interests of the United States, and on the night of February 15, 1898, a terrible explosion caused its destruction and the loss of two-hundred sixty-six men. The finding of the Court of Inquiry which sat in consultation for more than a month to determine the cause of the disaster, was that the vessel had been wrecked by an exterior submarine mine. Though the Spanish government was not directly implicated, the sentiment that the explosion was due to a deliberate plot grew current, and the feeling against Spain became intense. With an appropriation of $50,000,000 by Congress at his request, President McKinley hastened the establishment of coast defenses, and on April 19, war was declared. Two hundred thousand volunteers were called for, and the regular army, numbering 27,000 was increased to 50,000. The demand, meanwhile, had been made of Spain that all authority over the island be given up, and that Cuba was entitled to a free and independent government.

The first important battle was fought at Manila Bay. Commodore George Dewey had been sent to the Philippine Islands to capture or destroy the Spanish ships, and on May 1, he entered the harbor of Manila Bay and annihilated the Spanish fleet with a loss to Spain of a large number of men, while the Americans suffered no loss by death, and only seven men were wounded. Manila was captured on the 13th of August and the Philippine Islands were lost to Spain.

In the meantime, Spain had sent a fleet under Admiral Cervera to the defense of Cuba. The position taken was in the harbor of Santiago, off the southern coast of Cuba, and General Linares with his army garrisoned the city. General Shafter was sent with 16,000 men on the expedition against Santiago. Admirals Sampson and Schley were then blockading the coast, Schley being in temporary command during the absence of Sampson. On the first of July the engagements at San Juan and El Caney resulted in victory for the Americans. The Rough Riders, commanded by Colonel Wood and Lieutenant Roosevelt, won distinction for the active part they played in these battles. Two days later Admiral Cervera attempted an escape from the harbor, and, after a day's running fight, under terrific fire from the enemy's battleships, the Spanish fleet was destroyed, with a considerable loss of life on both sides. A bitter controversy arose at the close of the war among the friends of the two admirals, Schley and Sampson, as to the credit for the victory of Santiago. In 1901 a court of inquiry meeting at Schley's request, disagreed as to the verdict. Two of the men decided in favor of Sampson, but Admiral Dewey, the third member, presented a minority report in which he gave the honor to Schley. This discussion embittered the last years of Admiral Sampson's life and prevented his receiving any official acknowledgment of his services.

The island of Porto Rico was secured by General Nelson A. Miles shortly after

the Battle of Santiago. The campaign on the island was brief and the loss of men was slight. Shortly after these defeats the Spanish government began to sue for peace, making its appeal through the French minister at Washington. On August 12 President McKinley issued a peace-protocol, and in December, after a meeting of the commissioners, the treaty of peace was accepted. The following provisions were made: Spain was to relinquish all rights to Cuba; surrender Porto Rico to the United States, also Guam and the Philippine Islands.

The sum of $20,000,000 was paid for the Philippines.

English sparrow.

Song sparrow.

For a long time the question of Philippine self-government was an extremely perplexing one. It was not until April 2, 1901, that Aguinaldo, who had been captured by General Funston, after repeated revolts against American control, swore allegiance to the United States. Various attempts were made to set up civil government, and the commission appointed by the president, in 1900, assumed legislative control. William H. Taft, as president of this commission, became civil governor on July 4, 1901.

The war lasted 113 days and cost the United States $165,000,000. It was comparatively bloodless, for, of the estimated 3,000 American soldiers who lost their lives, only 306 died from wounds, while the remainder met their death from disease. The war caused the United States government through the acquisition of the Philippines to be recognized as a factor in the Far East and to have a new importance among the world powers.

See AGUINALDO; CUBA; DEWEY; MANILA; PHILIPPINES; PORTO RICO.

Spanish Bayonet. See YAM; YUCCA.

Spanish Language. See LANGUAGE.

Spanish Literature. See LITERATURE, SPANISH.

Spanish Moss, a hoary, gray air-plant hanging from the branches of trees, chiefly of the Gulf States. It is not a moss. Small yellow flowers with outcurved petals may be seen on examination. Although an air-plant, it is related to the pineapple. Spanish moss gives a funereal appearance to Southern forests, draping the live oaks like a bridal veil, but with a weird effect far removed from bridal festivities. It is much used by cabinetmakers for cheap upholstering. It takes the place of sphagnum for packing purposes.

Spanish Succession, War of. See MARLBOROUGH, DUKE OF.

Sparks, Jared (1789-1866), an American clergyman, educator, and historian. He was a native of Cambridge and was graduated at Harvard in 1815. From 1819 to 1823 he was the pastor of the Unitarian

Church of Baltimore. From 1839 to 1849 he was professor of history at Harvard, and was its president from 1849 to 1853. Before his residence at Baltimore and again after his return to Boston, he was the general editor and part owner of the *North American Review.* He traveled extensively. As a historian, he was one of the earliest to apply himself to original sources. He is known chiefly as the editor of the *Correspondence of George Washington, with a Life of the Author, The Works of Benjamin Franklin, The Library of American Biography,* etc. The latter included lives of Arnold, Allen, Marquette, and La Salle. Modern historians have found much fault with Sparks' custom of omitting, or even slightly modifying, portions of his material for fear of injuring the mind or morals of the young reader. His works are readable, but have been superseded. His collection of books is owned by Cornell University.

Field sparrow.

Sparrow, the largest of all bird families, including over 500 species. The goldfinch, crossbill, grosbeak, cardinal bird, red poll, bunting, and junco all belong to this family. The sparrows' proper are chiefly small, brown-streaked birds admirably adapted to field life. They nest usually on the ground, relying on the turf-like appearance of the nests to escape detection. The bill of the sparrow is stout and conical, designed to crack chaff and the hulls of seeds. Some of the species devour insects, but seeds are their natural food.

The European or English sparrow was brought in cages from England to the parks of Boston in 1851 under a mistaken notion that it would relieve the trees from an army of destructive worms. Others were liberated in Central Park, New York. These sparrows have become an established pest, second only to rats and mice, and bid fair to desecrate the buildings of every farm, village, and city in North America.

Several of our native sparrows may be distinguished easily. The chippy or chipping sparrow is quite like the English bird. only it is more slender and is given to building in vines under piazzas and similar places of shelter. The vesper sparrow runs ahead in the road showing a white feather on either side of the tail when it flies. Its evening song is full of music. Dickcissel. with a black throat, yellow breast, and stout bill, is given to sitting on weeds, fences, and telegraph wires in fine weather, uttering a note much like the latter part of his name with tremendous energy and earnestness. The song-sparrow is a sweet singer. "When alarmed it flies downward or along—never upward—into some low thicket, pumping its tail as it flies." The white-throated sparrow of the North is the bird of which Thoreau, camping in the Maine woods, writes, "I lay awake very early and listened to the clear, shrill *ah-tette-tette-te* of the white-throated sparrow repeated at short intervals for half an hour, as if it could not enough express its happiness." It is the sweet, plaintive "killoleet" of William J. Long's *Wilderness Ways.* It is a most delightful bird, suggestive of vacation, a birch-bark canoe, and the pleasures of camp life.

Sparta, a city of ancient Greece. It was the capital of the province of Laconia, and of the Spartan state. Unlike many of the cities of Greece, Sparta was irregularly

built and was not completely surrounded by walls, her boast being that her men were her walls. Laconia was the southeastern division of the Peloponnesus. The Spartans were descended from the Dorians who invaded the Peloponnesus about a century after the fall of Troy. Their earliest lawgiver was Lycurgus who lived probably during the ninth century B. C. His laws are characterized by their rigor and military character.

The population of Sparta was divided into three classes: The Spartans, descendants of the Dorians and the ruling class of Sparta; the Perioeci, original inhabitants of Laconia who were free, possessing land and carrying on trade; and the Helots. These were slaves bound to till the soil for their masters and to serve in time of war. By the Lycurgan code no Spartan could engage in trade or own land, war and the chase being their sole occupations. From the eighth to the sixth centuries B. C., Sparta carried on a series of wars that made her supreme not only in the Peloponnesus, but in all Greece. The Persian wars of the fifth century resulted in supremacy passing to Athens, though Sparta regained it temporarily in what is known as the Peloponnesian War. With the rest of Greece, Sparta became subject to Rome in 146 B. C.

Spartacus, in Roman history, a gladiatorial leader. In 73 B. C. a band of gladiators, under the leadership of a Thracian named Spartacus, escaped from a school at Capua. They plundered a cook shop, where they armed themselves with spits and chopping knives. Happening to meet a chariot filled with gladiatorial arms, they seized these and intrenched themselves on a vine-covered mountain. Escaped slaves and the dissatisfied generally joined their ranks, until the mountain was garrisoned by a force of 70,000 men. Three Roman armies sent to subjugate them were defeated. The Romans were much alarmed lest the states subject to Rome at this time would rise in revolt under the leadership of Spartacus. The revolt was suppressed, however, by Crassus and Pompey. Spartacus had kept the field for three years before he was slain. Elihu Burritt has used this incident skillfully in his *Address to the Gladiators,* a piece of rhetorical writing well known to the school boy. See GLADIATOR.

Spawn, the eggs or ova of fishes, mollusks, crustaceans, and many amphibious animals, as frogs, toads, etc. The term as used is confined to the roe of the female. The corresponding product of the male is milt. The number of eggs produced in a season varies greatly. The spawn of the codfish is thought to comprise several million eggs. Many fishes prepare level places in gravel beds and elsewhere, or inclosures, even nests, in which to leave their spawn. Fishes of some species ascend rivers to deposit the spawn in the small streams in the head waters. Other fishes go down stream to place their eggs in the sea. It is not difficult to cause the female fish to discharge the spawn by pressing or stripping the body with the hand much as the cow is milked. In fish hatcheries this method is employed to obtain spawn and milt from which to rear young fish. Ordinarily, fishes abandon the spawn as soon as it is discharged, though some wait about the nest to defend it from intruders. The lobster carries her spawn in a mass under her tail until the young are hatched and able to take care of themselves. Certain toads carry the spawn in pits on the back. The term, "spawn," is never given to the eggs of scaly reptiles, as the crocodile, nor to the eggs of birds. The pickled spawn or roe of certain large fishes, notably the sturgeon, is an esteemed article of food. It is known in commerce as "caviare," a word of Turkish or Tartar origin. See OYSTER; CAVIARE; HERRING; SALMON; CODFISH, etc.

Speaker, the presiding officer of a representative assembly. The office originated in England. The early and weak House of Commons was wont to elect some one to speak for that body to the king. He gradually became the presiding officer. In the nature of the case, the speaker is elected by the members from their own number. Although the members of the British House of Commons serve without pay, their speaker receives $25,000 a year. He is a member of the king's privy council. On his retirement he is raised to the peerage, with a seat in the House of Lords, with a pension of $20,000 a year. The American

speaker serves for two years, that is to say, during the life of the Congress. His compensation is $12,000 per year and mileage, with an allowance for clerk hire. His position is one of great power and influence, both in the appointment of committees and in the shaping of legislation. The speaker of the House of Representatives in the various states is selected in a similar manner. The first American speaker was F. A. Muhlenburg of Pennsylvania. Joseph G. Cannon of Illinois, speaker of the Fifty-ninth Congress, was the thirty-fourth man to occupy the chair. Henry Clay served three different times, in all ten years. Many a speaker has desired the presidency, but James K. Polk is the only one who has held both offices. Schuyler Colfax is the only speaker who served as vice-president and presided over both the House and the Senate. See BLAINE; REED; CLAY; CONGRESS.

SPEAKERS OF THE U. S. HOUSE OF REPRESENTATIVES.

1789-91.	F. A. Muhlenburg, Pennsylvania.
1791-93.	Jonathan Trumbull, Connecticut.
1793-95.	F. A. Muhlenburg, Pennsylvania.
1795-99.	Jonathan Dayton, New Jersey.
1799-1801.	Theo. Sedgwick, Massachusetts.
1801-07.	Nathaniel Macon, North Carolina.
1807-11.	Joseph B. Varnum, Massachusetts.
1811-14.	Henry Clay, Kentucky.
1814-15.	Langdon Cheves, South Carolina.
1815-20.	Henry Clay, Kentucky.
1820-21.	John W. Taylor, New York.
1821-23.	Philip P. Barbour, Virginia.
1823-25.	Henry Clay, Kentucky.
1825-27.	John W. Taylor, New York.
1827-34.	Andrew Stevenson, Virginia.
1834-35.	John Bell, Tennessee.
1835-39.	James K. Polk, Tennessee.
1839-41.	R. M. T. Hunter, Virginia.
1841-43.	John White, Kentucky.
1843-45.	John W. Jones, Virginia.
1845-47.	John W. Davis, Indiana.
1847-49.	Robert C. Winthrop, Massachusetts.
1849-51.	Howell Cobb, Georgia.
1851-55.	Linn Boyd, Kentucky.
1855-57.	Nathaniel P. Banks, Massachusetts.
1857-59.	James L. Orr, South Carolina.
1859-61.	Wm. Pennington, New Jersey.
1861-63.	Galusha A. Grow, Pennsylvania.
1863-69.	Schuyler Colfax, Indiana.
1869-75.	James G. Blaine, Maine.
1875-76.	Michael C. Kerr, Indiana.
1876-81.	Samuel J. Randall, Pennsylvania.
1881-83.	John W. Keifer, Ohio.
1883-89.	John G. Carlisle, Kentucky.
1889-91.	Thomas B. Reed, Maine.
1891-95.	Charles F. Crisp, Georgia.
1895-99.	Thomas B. Reed, Maine.
1899-1903.	David B. Henderson, Iowa.
1903-1911.	Joseph G Cannon, Illinois.
1911-1918.	Champ Clark, Missouri.
1918-	Frederick H. Gillett, Massachusetts.

Speaking Trumpet, an instrument with a spreading, somewhat funnel-shaped lip, used by a fire chief, or an officer at sea, to give commands. When the speaker places the small end at his lips and shouts an order, the trumpet prevents the waves of sound from spreading, and directs them in a sort of sheaf to the spot toward which the trumpet is pointed. In this way the whole force of the speaker's voice, though scarce heard elsewhere, is concentrated in one line of sound. Acting on the same principle the speaking tube used in houses and in offices, especially in communicating from one floor to another, is exceedingly serviceable in its place; but a tube of uniform diameter cannot be made to carry sound to a point distant from its extremity. See SOUND.

Specie, metallic money. See COIN.

Specific Gravity, in physics, the ratio between the density of a given substance and that of another taken as a standard. The distinction between specific gravity and density is real, but not important. For table, see DENSITY.

Specific Heat, the quantity of heat required to change the temperature of a unit of mass of any substance 1° C. It takes more heat to warm a pound of alcohol than it does to warm a pound of lead to the same temperature. We say therefore that the specific heat of alcohol is greater than that of lead. The amount of heat required to raise the temperature of a unit of water 1° C, is taken as the unit of specific heat. If we say that the specific heat of glass, for instance, is two-tenths, we mean that the same amount of heat will raise the temperature of a pound of glass five times as much as it will a pound of water. For a number of common subjects the following is

A TABLE OF SPECIFIC HEAT.

Water	1.
Ice	0.5
Steam	0.5
Alcohol	0.6
Glass	0.2
Iron	0.11
Copper	0.095
Lead	0.031

Platinum	0.032
Gold	0.032
Air (at constant pressure)	0.24
Hydrogen	3.4

Spectacles, a pair of lenses used to protect the eyes or to aid vision. The inventor of spectacles is unknown, but is generally supposed to have been Roger Bacon, who lived in the thirteenth century. The term *spectacles* is usually applied to a frame with side pieces that extend over the ear—and the term *eyeglasses* to lenses held in place by a pince-nez which presses against the sides of the nose.

Defective vision is usually due to defects in the form of the eye. Far-sightedness is caused by too slight a curvature of the cornea or lens and may be corrected by the use of convex lenses. Near-sightedness is caused by too great a curvature of the cornea or lens and may be corrected by the use of concave lenses. Astigmatism is due to a structural defect of the eye, and may be corrected by cylindrical lenses that bring the rays of light to a common focus on the retina.

Many require spectacles that aid in viewing distant objects and those near the eye—as in viewing a landscape and reading a book. The science of optometry has been brought to such a degree of perfection that lenses are ground so as to meet both requirements in the same spectacles and also to correct any defects arising from astigmatism.

Mere far or near sightedness may be corrected by spectacles that can be procured at oculists and department stores, but one in need of spectacles runs more or less risk in purchasing them without having the eyes tested. In cases of astigmatism a test by a skillful oculist is necessary, since each eye usually requires a special lens.

Spectacles should be used when needed whether the person is young or old. Many children are at a disadvantage in school because of defective vision.

Many birds are provided with natural spectacles, a transparent membrane called the third eyelid. This eyelid, when not in use, lies folded in the inner corner of the eye. Two muscles spread it over the cornea. But for its third eyelid many a bird could not dive from a height.

Spectator, The, the name of two entirely different London papers. The first was a small society sheet founded by Joseph Addison and Richard Steele. It was issued daily from March 1, 1711, to December 8, 1712, and, after suspension, from June 18 to December 30, 1714. It reached 635 numbers. The present London *Spectator* is an influential weekly, ranking with the *Saturday Review* and the *Atheneum*. It was founded July 5, 1828. During our Civil War the *Spectator* took up the cause of the North. The triumph of the national cause gave the *Spectator* prestige at home and abroad. See STEELE; ADDISON; COVERLEY, SIR ROGER DE.

Spectroscope. See COLOR.

Spectrum. See COLOR.

Speedwell, a ship fitted out by the Pilgrims in Holland for their journey to the New World. The Speedwell set out from Southampton with the Mayflower in 1620, for New England, but, meeting with a series of mishaps, was sent back from Plymouth, England. Those of the Pilgrim party who had become disheartened were sent back to Southampton in the Speedwell. See PILGRIMS.

Speke, speek, **John Hanning** (1827-1864), an African explorer. He was a native of Somersetshire, England. In 1844 he obtained a commission in the British army in India. He acquired a reputation not only as an officer, but as a huntsman and naturalist. As often as he could obtain a furlough, he spent it in making expeditions into the Himalayas and across the frontier into Egypt. In 1854 he was a member of an exploring expedition in Somaliland, south of Abyssinia. Three years later he undertook a second exploration in the course of which he discovered Lake Victoria Nyanza. In 1863 he revisited this lake and, starting from its outlet, traced the Nile northward. Captain Speke is known among geographers as having first given to the world a trustworthy knowledge of the sources of the Nile. After enduring no end of hardship in Africa and encountering danger in every form from natives and wild animals, he was killed at home in England by the accidental discharge of a fowlingpiece while crossing a fence. His principal book is a *Journal of*

the Discovery of the Nile, published in 1863 in two volumes. See NYANZA; NILE.

Spelling, forming words with letters. Each language has its difficulties, some place of laborious passage, some citadel that must be taken. The traditional schoolboy, attempting Greek, meets solid squares of verb forms, grim and impenetrable, reminding him of the Macedonian phalanx of which he may have read in his ancient history. The Latin verb is comprised within narrower limits, perhaps, but its marching legions extend over many a fair page and have carried dismay into the hearts of young recruits for generations. The variations of Sanskrit and Hebrew are reported to be as the sands on the seashore, almost beyond computation. French and German have so many niceties of declension and conjugation, of position, of vowel changes, of accent, and of gender, that only the educated make the slightest pretension to speak or to write their native language correctly. In these particulars English is simple and is delightfully free from hindrances. A half-dozen verb forms, twice as many forms of the pronoun, two or three changes in a noun, say a score of variations in all, and the inflection of the English language is practically in hand. But we do have spelling. We escape the toil and the danger of inflection, but we still have the most unsystematic, law-defying, uncouth, thoroughly intractable, and yet the most homelike and attractive spelling that has found place in a dictionary.

First of all, we have many words. Ours is not a primitive language. The creative mind is not content with a plain garb for plain thought, a primitive word or two for a simple idea. We have multiplied words, and colored our vocabulary, and refined our meanings, until one word will no more cover the changing tints and shades of an idea than one word will describe the blending hues with which autumnal leaves are decorated. Take the term *little,* for instance. Nothing can be more simple. An object is little when it lacks size, when there is not much of it. That is all there is to the idea. The word *little* would seem quite adequate. But the artistic mind is not satisfied with one word. People delight in variety. The more vigorous the intellectual life of a people, and the more they have to say worth the saying, the greater the variety in their speech. Hence our wealth of words. Not content with *little,* we speak of the *small* hours, a *tiny* harebell, a *wee* lassie, a *petite* slipper, a *minute* grain, a *diminutive* donkey, a *slight* consideration, a *minimum* payment, an *infinitesimal* portion, a *faint* trace, a *remote* chance, a *petty* crime, a *trivial* fault, a *trifling* annoyance, an *unimportant* loss, an *insignificant* appropriation, a *paltry* sum, an *inconsiderable* source, of *Lilliputian* stature, a *feeble* income, a *slender* purse, a *stingy* allowance, a *low* estimate, in *reduced* circumstances, on *meager* information, and, not to extend the list laboriously, *microscopic* animals.

It is contrary to the laws of development to hope for help from a decrease in the number of words in current use. We already have more words than any other language, ancient or modern. We English-speaking people are so active and are scattered so widely that we are multiplying words faster than any other people. What between digging up old forms and the invention of new, together with an incessant adoption of such terms as "khaki," "laager," "trek," and "boloman,"—words that have a relish for the reporter and a fascination for the reader,—it is not too much to suppose that our working vocabulary grows at the rate of a word a week. Indeed, an increase of five hundred words in ten years is not an overestimate, as the history of any prominent dictionary will testify. There is no relief in this direction; the speller will never be able to get off with fewer words.

Nor is anything to be gained by an underestimate of the number of words in common use. We hear, on supposed authority, that a workingman uses five hundred words; when, in fact, the witty section-man, leaning on his shovel, uses that many thousands of words as he descants on the earth he digs into, the state of the atmosphere that surrounds him, the world that rolls by him, and the world he lives in. Children, too, understand the meaning of more words than they are given credit for. A thousand words is nothing unusual for a four-year-old child. Children entering school at six very frequently have a vocabulary of two thousand words. The writer believes that

few English-speaking children enter school with less than five hundred words at command. Educators are not justified in assuming that few words are needed, or that few words are in use.

The perplexities of learning to spell are many. German children, once they can pronounce a word, are reasonably sure of how to "letter" it. The sound is a guide to the spelling and the spelling is a guide to the sound. It is claimed that in this respect German children have the advantage by a school year over their English-speaking cousins, who are unable to spell as they pronounce and equally unable to pronounce a word as it is spelled. In case a schoolgirl desires to write that she is no longer privileged to enjoy the instruction of a former teacher, she will get on as far as "We have a"— Then comes a series of pitfalls. Shall she write *nu, neu, nue, gnu, knew, pneu, newe, neau, niew, nou,* or finally and rightly, "*new* teacher?" A philologist may gain satisfaction from the reflection that the vowel and consonant groups of these possible spellings are all authorized; but the wisdom and the pride of the philologist is far from being a present help to a child in trouble. She cannot enter into the ecstasies of the learned. All the little girl wants just now is to know how to write that she has a *new* teacher.

Illiteracy is at bottom poor spelling. Power to grasp the central thought of a sentence is inseparable from a rapid, discriminating eye. Rapid appropriation of printed thought is possible only to the owner of a searching and a certain eye. Spelling for purposes of writing, for composition, is a small part of its province. Pupils should learn to spell as a means of getting acquainted with words, as a means of mastering their own speech. Rules are of little avail. The habit of correct spelling should be well fixed and a considerable vocabulary should be mastered at an early age, before derivations can be made of service. Connect the word with the idea and learn to spell outright. Spelling exercises should be easy, familiar, frequent, sprightly, and accurate. Oral spelling should predominate. Within their capacity, children like to spell. They delight in brief, rapidly changing effort. The swift, correct spelling of well-known words develops conscious strength and pride of scholarship. Spelling should never be allowed to drag, to become a Bridge of Sighs, but should be a joyous entrance to the children's heritage,—the literature of their forefathers.

Many attempts have been made to reform our spelling, and some progress has been made. "Publick" has been shortened to "public"; one "l" is considered sufficient in "traveler"; programme" is on the point of losing the final "me"; "sulfur" seems to stand a fair chance of displacing "sulphur," etc. It is a question just how far spelling and pronunciation can be made to agree without loss of associations. "Esquimaux" has been shortened to "Eskimo" and is still sufficiently redolent of fur, fish, and blubber; but it is doubtful whether "mignonette" would retain quite its native fragrance if reduced to "minyunet." Doubtless science should drive whim and custom before it, and it were unwise to resist desirable changes; but, fortunately, it is not the part of the school to anticipate, but rather to follow usage.

Within recent years a movement for spelling reform has taken definite shape. The National American Educational Association has issued a short list of words spelled after the new fashion. This list embraces such words as "tho" for "though," "thru" for "through," "catalog" for "catalogue," etc. It has been adopted by several state associations, and President Roosevelt sought to give it vogue by using the new spelling in messages and other documents issued from the executive office. This latter use of the reformed spelling has since been abandoned. A more pretentious system of phonetic spelling has been adopted by the American Spelling Reform Association which has been indorsed by a similar association in England. Their method of orthography is outlined in the following rules:

1. e.—Drop silent *e* when fonetically useless, as in *live, vineyard, believe, bronze, single, engine, granite, eaten, rained,* etc.
2. ea.—Drop *a* from *ea* having the sound of *e,* as in *feather, leather, jealous,* etc.
   Drop *e* from *ea* having the sound of *a,* as in *heart, hearken,* etc.
3. eau.—For *beautv* use the old *beuty.*

4. eo.—Drop *o* from *eo* having the sound of *e*, as in *jeopardy, leopard.*
   For *yeoman* write *yoman.*
5. i.—Drop *i* from *parliament.*
6. o.—For *o* having the sound of *u* in *but*, write *u*, in *above* (abuv), *dozen, some* (sum), *tongue* (tung), etc.
   For *women* restore *wimen.*
7. ou.—Drop *o* from *ou* having the sound of *u* as in *journal, nourish, trouble, rough* (ruf), *tough* (tuf), and the like.
8. u.—Drop silent *u* after *g* before *a*, and in native English words, as *guarantee, guard, guess, guest, guild, guilt*, etc.
9. ue.—Drop final *ue* in *apologue, catalogue*, etc., *demagogue, pedagogue*, etc., *league, colleague, harangue, tongue* (tung), etc.
10. y.—Spell *rhyme* rime.
11. Dubl consonants may be simplified.
    Final *b, d, g, n, r, t, f, l, z*, as in *ebb, add, egg, inn, purr, butt, bailiff, dull, buzz*, etc. (not *all, hall*).
    Medial before another consonant, as *battle, ripple, written* (writn), etc.
    Initial unaccented prefixes, and other unaccented syllables, as in *abbreviate, accuse, affair*, etc., *curvetting, traveller*, etc.
12. b.—Drop silent *b* in *bomb, crumb, debt, doubt, dumb, lamb, limb, numb, plumb, subtle, succumb, thumb.*
13. c.—Change *c* back to *s* in *cinder, expence fierce, hence, once, peace, scarce, since source, thence, tierce, whence.*
14. ch.—Drop the *h* of *ch* in *chamomile, choler, cholera, melancholy, school, stomach.*
    Change to *k* in *ache* (ake), *anchor* (anker).
15. d.—Change *d* and *ed* final to *t* when so pronounced, as in *crossed* (crost), *looked* (lookt), etc., unless the *e* affects the preceding sound, as in *chafed, chanced.*
16. g.—Drop *g* in *feign, foreign, sovereign.*
17. gh.—Drop *h* in *aghast, burgh, ghost.*
    Drop *gh* in *haughty, though* (tho), *through* (thru).
    Change *gh* to *f* where it has that sound, as in *cough, enough, laughter, tough*, etc.
18. l.—Drop *l* in *could.*
19. p.—Drop *p* in *receipt.*
20. s.—Drop *s* in *aisle, demesne, island.*
    Change *s* to *z* in distinctive words, as in *abuse* verb, *house* verb, *rise* verb, etc.
21. sc.—Drop *c* in *scent, scythe* (sithe).
22. tch.—Drop *t* in *catch, pitch, witch*, etc.
23. w.—Drop *w* in *whole.*
24. ph.—Write *f* for *ph*, as in *philosophy, sphere* etc.

Spelter, a commercial name for zinc. The name is given also to a yellowish zinc solder used in closing brass joints. Bell metal is not infrequently known as spelter. See ZINC.

Spencer, spĕn'ser, **Herbert,** an English philosopher. He was born at Derby, April 27, 1820, and died at Brighton, December 8, 1903. His father was a schoolmaster and philosopher. Young Herbert was educated by his father and by an uncle. He was not sent to college. At the age of seventeen he was apprenticed to a civil engineer. He spent eleven years of his life in laying out and building railroads. During this time he contributed articles to the *Civil Engineers' and Architects' Journal;* also a series of letters to the *Non-Conformist* on the proper spirit of government. He appears to have been quite dissatisfied with both church and state. He contemplated migrating to some new country, where a more natural state of affairs prevailed. With this end in view, he studied the natural resources of New Zealand. He engaged in journalism and in writing philosophical works instead, and did not carry out his half-formed purpose. As a thinker and writer, Spencer belongs to the illustrious group in which Darwin and Huxley are found. His *Principles of Psychology,* based on evolutionary principles, appeared four years before Darwin's *Origin of Species.* While a mere lad reciting physics to an uncle, he had protested against the theory then prevalent that inertia was a live force inherent in matter. Spencer's works include *Social Statics, The Study of Sociology,* etc. In 1860 he announced a series of volumes to constitute a system of synthetic philosophy, but died before he had completed his work. Among his best known essays is that on education, in which he takes strong ground in favor of history, science, and industrial work, as well as the study of languages. See NEW ZEALAND; HUXLEY; SOCIALISM.

Spenser, Edmund (1552-1599), a famous man of letters. He was a native of London. Educated at Cambridge. He belongs to the Elizabethan age of literature, and is associated with Shakespeare and Bacon. Like Chaucer, he spent considerable time at court. He was sent as an envoy to France. He was secretary to the viceroy of Ireland for eighteen years, residing on a confiscated Irish estate near Dublin. Naturally enough, he wrote a volume on *The Present State of Ireland.* Two

literary works claim attention. *The Shepherd's Calendar* comprises twelve pastoral poems, one for each month in the year. Each consists of a poetical dialogue between two shepherds who have opportunity to speak of the time and season and to point out what is wrong in church and state. Spenser's masterpiece is *The Faerie Queene,* one of the great poems of English literature. The original plan of the poem is something stupendous. Twelve books were to recount twelve moral adventures. Each book was to consist of twelve cantos. If successful, twelve other books, likewise of twelve cantos each, were to follow. The second twelve were to describe political virtues, the "guardians of public faith." The whole scheme involved the writing of some 100,000 lines. Six books only were published, and still the poem is one of the longest in the language. In the first book, Holiness is the virtue personified; in the others, Temperance, Chastity, Friendship, Justice, and Courtesy. Each virtue is embodied in a knight who rides forth to overcome the evils and the vices that combat the virtue he represents. In the dedication of the poem to Sir Walter Raleigh, through whose influence the first cantos of the poem were published, Spenser sets forth his purpose:

> "The generall end of all the booke is to fashion a gentleman in vertuous and gentle discipline. Which I conceived shoulde be most pleasing, beeing coloured with an historicall fiction, which men delight to read, rather for varietie of matter than for profit of the ensample: I chose the historie of King Arthure, as most fit for the excellencie of his person, beeing made famous by many men's former works, and also furthest from the danger of envie, and suspicion of present time."

The framework of the poem is derived from the Welsh tale of King Arthur and his Round Table. The twelve champions are drawn more or less in accordance with the stirring characters of Raleigh, Gilbert, Drake, and others, who were carrying the British flag to the remote parts of the world. Una, the spotless maiden, has been identified more or less intimately with the virgin queen, Elizabeth, and Duessa, the false woman, with Mary, Queen of Scots. There is also a strong undercurrent of partisan defense of the English Church as was to be expected at the time. His pages are a panorama of knights, horses, ladies, fair fields, flowers, woods, birds, lions, dragons, restful ease, and stirring action—so highly imaginative that Lamb calls Spenser the poet's poet. The theme of each canto is the same. "It is a noble knight, fighting, overcoming, tempted, delivered, or a beautiful lady, plotted against, distressed, in danger, rescued. The poet's affluence of fancy and speech gives a new turn and color to each adventure."

The form of stanza employed by Spenser in the *Faerie Queene* was the poet's own invention. It consists of nine lines. The first and third lines rhyme; the second, fourth, fifth, and seventh; the sixth, eighth, and ninth. The ninth line is hexameter, that is, it contains six accented syllables instead of five, the number in the other lines. The first quotation from *Faerie Queene* will give the form of this stanza. Since the *Faerie Queene* introduced the "Spenserian Stanza," it has been used by many other poets. Examples are Burns' *Cotter's Saturday Night;* Keats' *Eve of St. Agnes,* and Byron's *Childe Harold.*

The first three books of *The Faerie Queene* were published in 1590; the others in 1596. "It became at once the delight of every accomplished gentleman, the model of every poet, and the solace of every scholar." In reading the poem, the moral purpose—the allegory—is forgotten, or remembered just enough to keep us from suffering the "pangs of painful pity" for the misfortunes of these gentle knights and lovely ladies. Welsh calls the poem a "phantasmagoria, one part allegory and nine parts beauty." As we read, we are lost, not so much in the story, as in the beauty. As Taine says, "We have that gentle feeling of knowing ourselves to be dreaming." It is poetry pure and simple.

Spenser is one of the great names in literature, but his work, popular as it was, received little pecuniary reward. His life was spent largely in hoping for office and the patronage of those in power, and his end was sorrowful. To understand this, it must be remembered that "before Shakespeare no man had been able to earn his bread by literary work." An Irish uprising resulted in the destruction of Spenser's home and the death of his youngest child.

He fled with his wife and family to London, took obscure lodgings, and died brokenhearted. His brother poets bore him reverently to burial in the Poets' Corner of Westminster Abbey where he rests by the side of Chaucer. "Poets attended upon his hearse, and mournful elegies, with the pens that wrote them, were thrown into his tomb."

Spermaceti, spĕr-ma-sē′tĭ, the peculiar fatty substance obtained in the cavity of the head of the sperm whale. It is used in the making of ointments, cosmetics, and in the manufacture of sperm candles. See WHALE; CANDLE.

Sperm Oil. See WHALE.

Sphagnum, sfăg′nŭm, a sort of moss growing in bogs and moist places. The upper ends of the branches produce soft, feathery, lightish green branchlets. There are about twenty-five species in North America. They form the characteristic and chief vegetation of the peat bogs. The lower parts of the stems turn into peat while the upper parts continue to extend branches and multiply. New plants are propagated by means of spores also. The tiny, translucent leaves and stems are penetrated by water ducts that enable a bunch of the moss to hold water like a sponge. Sphagnum is accordingly a favorite material with the nurseryman, who employs it to pack around the roots of nursery stock in shipment. A sphagnum bog, even on high land and well ditched, holds water tenaciously. The dead moss packs down but so long as it is moist it is proof against decay. See PEAT.

Sphere, sfēr, a geometrical solid, bounded by a surface every point of which is equally distant from a point within called the center. The sphere is the most interesting and perfect geometrical form. It attracted the attention of the ancients. It is one of the gifts given to children by the kindergartner. Euclid, in Greek mathematics, defined a sphere as a solid figure generated by the revolution of a semi-circle about its diameter. The particles of a liquid, as drops of rain, molten lead, etc., if left free to act naturally, arrange themselves in the form of a sphere. Some of the more important mathematical facts may be mentioned:

Every section of a sphere made by a plane is a circle.

Any section made by a plane passing through the center is a great circle.

Every great circle bisects the surface of the sphere.

The diameter is obtained most readily by placing the sphere between two parallel surfaces or blocks and then measuring the distance between them.

Using the numbers abstractly, we may say that the surface of a sphere equals the circumference multiplied by the diameter. The result may be obtained by multiplying the square of the diameter by 3.1416.

The area of the surface equals the area of four great circles.

The volume equals the surface multiplied by one-third of the radius or by one-sixth of the diameter. This result may be obtained by multiplying the cube of the diameter by .5236.

The surfaces of two spheres are to each other as the squares of their radii, or as the cubes of their diameters, etc.

The surface of a sphere is equal to the concave surface of a circumscribed cylinder.

The volume of the sphere is equal to two thirds of that of the circumscribing cylinder.

The volume of a sphere is equal to .5236 of the circumscribing cube.

Sphinx, sfĭnks, in Grecian and Egyptian mythology, a fabulous monster half beast, half human. The Greek sphinx was figured in art as having the body of a lion, the wings of an eagle, and the breast and upper part of a woman. Sphinxes of this sort are a characteristic form of sculpture in Cyprus. A wingless sphinx stands on the sacred road near Miletus. Half a dozen small specimens in gold were found in a tomb at Myconos. A sphinx appears among the ornaments of the helmet of the statue of Athena in the Parthenon. Sphinxes carrying off children were sculptured on the front feet of the throne of Jupiter at Olympus. For an account of the Theban sphinx, the most famous in Greece, see OEDIPUS.

The term is Greek and is supposed to be allied to a word signifying the binder, the throttler, hence Death. The resemblance between the Grecian and Egyptian sphinxes may be accidental. The latter is without wings, and the head is usually that of a man, the breast is that of a lion. The Egyptian sphinx appears in Assyrian art, especially as the guardian of doorways. Colossal sphinxes in porphyry and granite are not unusual in Egypt. The most not-

ed, the one mentioned usually as The Sphinx, is situated near Gizeh, about a quarter of a mile southeast of the Great Pyramid. It has the form of an enormous crouching lion cut from a single rock. The body is 140 feet long and 63 feet high. The head is thirty feet in length from chin to forehead and is about fourteen feet wide. Flaws in the rock are filled in with masonry. Its outstretched paws, fifty feet in length, are cased in masonry. Between them an inclined passage partly of rock-hewn steps, leads up to the chest at the front of which a memorial tablet fourteen feet high leaned. No interior cavity has been found.

It was formerly believed that the Sphinx was a personification of the sun god Ra, the Harmachis of the Greeks, but it is now claimed by Professor Reisner, a leading Egyptologist, that the head of the Sphinx is a portrait of King Chephren (cir. 2800-2700 B. C.), in whose reign it was built, and who was also the builder of the second pyramid. For centuries, the sands have buried it to the chin, yet without protecting it from ruin. Its battered body preserves but the general form of a lion's body. The paws and breast, restored by the Ptolemies and the Caesars, retain but a part of the stone facing with which they were then clothed in order to mask the ravages of time. The nose and beard have been broken off by fanatics, and the red hue which formerly enlivened the features is almost wholly effaced. And yet, notwithstanding its fallen fortunes, the monster preserves an expression of sovereign strength and greatness. The eyes gaze out afar with a look of intense and profound thoughtfulness, the mouth still wears a smile; the whole countenance is informed with power and repose. Emerson's well known lines,

> The Sphinx is drowsy,
> Her wings are furled;
> Ier ear is heavy,
> She broods on the world,

are descriptive rather of the feminine winged Grecian sphinx than of the masculine bearded sphinx of Egypt.

See PYRAMID; EGYPT.

Spice, a general name for a number of aromatic and pungent vegetable substances used for flavoring. They are produced almost exclusively in tropical countries. Most of our spices come from the East Indies and the West Indies. Their aroma and strength lie in essential oils which they contain. The seed, fruit, buds, bark, and root-stocks of various plants are used as spices.

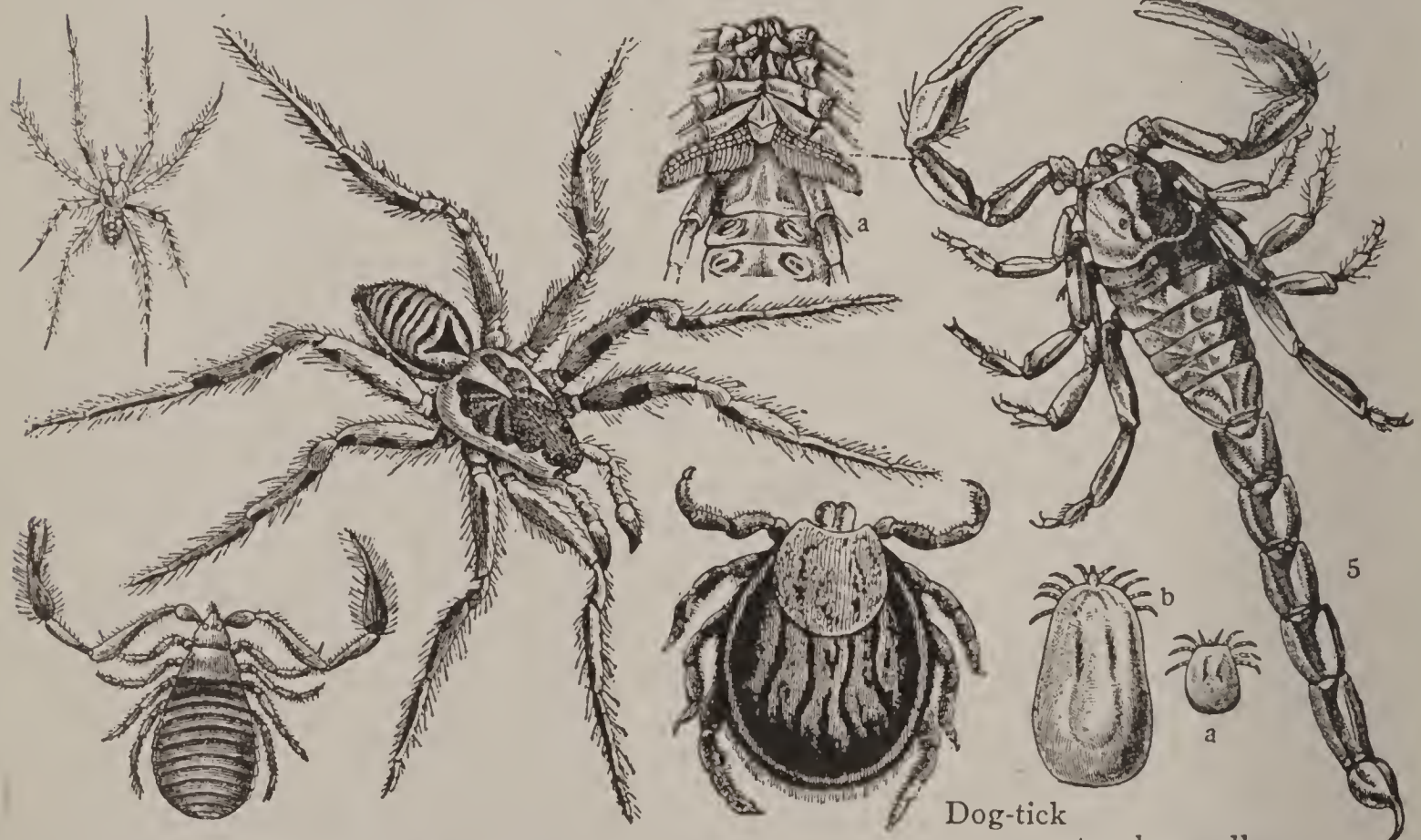
Spice Islands, or **Moluccas,** a group of islands situated in the Malay Archipelago between Celebes and New Guinea. The surface is mountainous. The islands are celebrated for the production of cloves and nutmegs. The islands were discovered and exploited by the Portuguese, but have belonged to the Dutch for three centuries. Area, 43,864 square miles. Population, 407,906.

Spider, a large order, nearly allied to insects but distinct from them. The spider is placed midway between the crayfish and the true insect. Some cave species are blind, but the spider usually has four pairs of eyes. Spiders have eight legs, no wings, and no feelers. All eat flesh. The abdomen is not jointed. It bears organs at its end for spinning silk. These organs consist of finger-like projections, on the tips of which are many fine tubes, as high as two hundred, through which the spider ejects or squeezes out a fluid which hardens on exposure to the air. By bringing the tips of the finger-like spinnerets together, the spider can cause the strands to unite in a single thread, or by holding the spinnerets in a row a filmy ribbon can be made. An examination of the web of a spider shows that the threads are of two kinds. If one touches a supporting thread, one that runs from the center out, or a brace, it will be found to be dry and rigid. The threads that run around and around, forming the body of the web, are elastic and sticky, ready to adhere to an insect and to stretch without breaking. Two kinds of spiders eject the fluid silk from the spinnerets into a sort of nipple from which they comb threads with their hind legs.

The spider uses its thread for many purposes, most noticeably in the construction of a web in which it hopes to capture heedless insects. Once an insect is ensnared, the spider is on it at once. If the insect be strong the spider hastens to tie it up in folds of silken thread. A large number of

Diadem spider—a, female; b, male; c, arrangement of eyes; d, foot; e, fang with poison gland; f, spinning apparatus; g, spinnerets; h, threads.

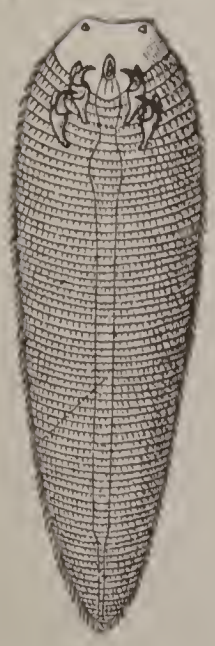
Web spinner—
a, arrangement of eyes;
b, egg sack.



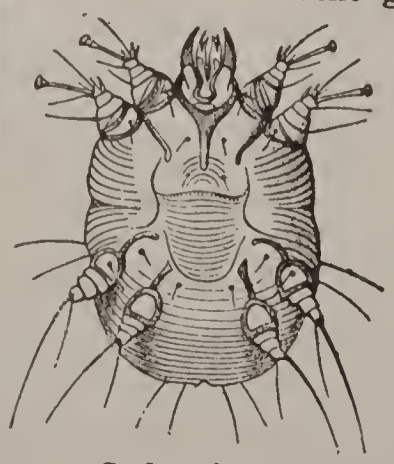
Book scorpion. Apulian tarantula. Violet-red wood-tick.

Dog-tick
a. empty; b. swollen.
5. Field scorpion—
a. mouth parts.

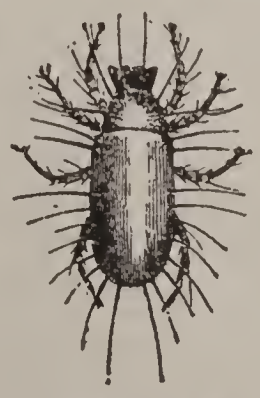
Vine gall-mite.



Pentastomum, a human mite.



Itch mite.



Cheese mite.

Weasel spider.

Follicular mite, human mite.

THE SPIDER AND ITS RELATIVES.

spiders, including tarantulas and others, called running spiders, chase their prey instead of catching it in webs. The spider weaves a silken purse in which to keep her eggs. Some species of running spiders carry this in the mouth or drag it by a cord. It is very light and seems no impediment at all.

The spider's thread is of use to it in traveling. If it wishes to drop, it is only necessary to fasten a thread and swing off, paying out thread as it descends. It can climb up by the same route. If the breeze be right, the spider can cross a wide chasm by means of a suspension bridge of its own construction. A thread is fastened at the proper place. The spider then pays out thread which is caught by the wind and carried across. When the farther end has been caught by some object the spider pulls it tight and the bridge is ready. In fine autumn days, the flying spider climbs to the top of a weed and pays out loops of thread until spider and loops are caught up in the moving air and are wafted, it may be, hundreds of miles, sailing, as the Scotch poet, Hogg, puts it:

Mid the golden air
In skiffs of yielding gossamere.

These are the threads that the astonished ploughboy sees stretching from clod to clod on newly ploughed land.

The several families of spiders may be told apart readily by the shape of their webs or by want of them. Running spiders that spin no webs have been mentioned. The funnel-web weavers are long-legged brown spiders that build sheets of web on guys running to different blades of grass. They have a funnel-shaped lair in one corner where the maker lurks till an insect falls into its web. The funnels of the grass-spider webs are the most common in meadows. Frequently they half cover the stubble of a recently cut field. The traditional unshapely cobweb heartily dreaded by the careful housewife, and formerly prized by the surgeon in staunching the flow of blood from a cut, is made by a small, slim-legged spider that runs about, back downward, on the under side of its web or hides in a crevice until the presence of game demands its attention.

The beautiful, large, circular webs with supporting threads running from the center outward like the spokes of a wheel are made by several species of plump spiders. The spider goes at this work systematically. The space to be occupied by the web is first surrounded by an irregular line, fenced in as it were, passing from twig to twig and inclosing a many-sided figure. The next step is to fasten a thread at a chosen point in this outline and then walk round to the opposite side, spinning slowly. Here the spinner fastens the other end so that the thread is stretched straight across the space. The spider then goes out on this thread, fastens a new line to it at the proposed middle of the web, comes back, and attaches this new line to the outer boundary an inch or two from the first line. By repeating the operation a wheel is formed with spokes radiating from the center. The spider now goes to the center and starts a new thread, a stay rope or brace, which it carries around several times, like a spiral, each time farther out, and always crossing the spokes at right angles, until it approaches the outer line. All these lines are stiff and hard. The industrious spider then begins anew at the outside with a new thread, carrying it around again and again, each time a little further in until the center is reached. This last thread is sticky and elastic, so that a fly caught at any point may flounder about stretching the thread until hopelessly entangled in several strands. An orb-weaver of this sort is the spider reputed to have saved the life of Robert Bruce, the future king of Scotland, by spinning its web with marvelous rapidity across the mouth of a cave in which the Bruce had taken refuge. His enemies, seeing a large web across the entrance, thought he could not have gone in there and in their haste passed on.

A spider's line is the finest thread known. It is estimated that 30,000 of them may lie side by side within the compass of an inch, and that a thread long enough to reach around the globe would weigh not to exceed a pound or two. On account of its fineness the thread spun by the spider is used for the cross-lines of telescopes. Like the milk of a cow, the amount of thread that a spider can spin at any one time is limited.

There are spiders of some sort wherever

there are insects to be eaten. Some live in water, some in deserts; some live in forests, others in meadows; some live in the open air, others desire the protection of a cave, a hollow tree, a barn, or a house. Some are smaller than the smallest gnat; others, found in Mexico, are as large as hummingbirds.

See TARANTULA; SILK; GOSSAMER.

Spike. See NAIL.

Spikenard, an herb related to valerian. It is found in the Himalayan region. The plant has been used by the Hindus as a medicine from the remotest ages. An oil with a heavy odor derived from the leaves is much employed as an ointment. The spikenard of the druggist consists of pieces of the root-stock, still covered with fibrous remains of leaf stalks. The ancients made an aromatic ointment in which spikenard was the chief ingredient. It was highly prized and commanded a high price among the western nations. Some of the bystanders are represented in Mark xiv as finding fault with the woman who came "having an alabaster box of ointment of spikenard very precious; and she brake the box and poured it on his head." They thought that so costly an ointment should have been sold, and the money bestowed on the poor. Various aromatic plants are known as spikenard. The American spikenard is a much-branched herb with large leaves and aromatic root-stocks. It is known botanically as *Aralia.* It is related to the wild sarsaparilla and grows with it in deep, rich woods. Several of the valerians are known as spikenards. See OIL; PERFUMERY.

Spinach, spĭn′āj, a well known annual herb belonging to the goosefoot family. Its original home was probably southwestern Asia. It is cultivated everywhere for its arrow-shaped root leaves, which are eaten for greens. Botanically, it is related to the pigweed, goosefoot, blite, and saltwort. It is cultivated in much the same way as lettuce.

Spinal Cord, the spinal marrow or nervous cord which runs through the backbone, that is to say, through the spinal canal from the brain of every vertebrate. The cord is continuous with the brain. See BRAIN.

Spindle. See SPINNING.

Spinet. See PIANO.

Spinning, the art of forming thread or yarn by drawing out and twisting fibers of wool, cotton, flax, silk, and other materials. We have no information as to the first spinning processes, but, without doubt, the crude twisting of certain fibers into thread or cord was among the first acts by which mankind attempted to meet the requirements of everyday life. The implements of early hand spinning were the distaff and spindle. The distaff was held under the left arm with a bunch of wool or flax attached to its end. The spindle was a stick ten or twelve inches in length and slit at the top. The spinner or spinster drew out the fibers from the bunch on the distaff, formed them into a thread with her fingers, fastened the end of the thread into the slit of the spindle, and rolled the spindle on her thigh to help twist the thread. When she had spun enough thread to warrant it, she detached the end of the thread and wound the length about the spindle; then replaced the thread in the slit and proceeded as before. After a time the spindle was placed in a whorl of stone or metal, which kept it steady and in which the spinner could readily whirl it. Later it was rotated by the belt of a spinning wheel. Spinning wheels were in common use in Europe by the end of the fifteenth century. With the wheel a spinner could produce seven times as much yarn in a given length of time as with distaff and spindle.

In 1767 the Hargreaves jenny was introduced, having been invented two or three years previously and used by Hargreaves in his own spinning. By the use of the spinning jenny one spinner could produce eight threads at the same time. Soon the jenny was improved until eighty threads could be spun at once. Up to this time six spindles had been required to produce sufficient yarn to keep one weaver in work. A few years later, Arkwright invented the roller spinning frame. In the Hargreaves jenny the thread is drawn out by the spindle. In the Arkwright machine it is drawn out between rollers, of which there are several pairs. The next step was the invention in 1779 of Crompton's spinning mule which combined the essential features of the Hargreaves and Arkwright machines. By the spinning

mule the thread is drawn out between rollers, but, after leaving the last pair of rollers, it is drawn out still finer by a traveling frame carrying spindles, similar to that in use in the Hargreaves jenny. The spinning machines of the present time, while showing many improvements, are based upon the same principles as those involved in the Arkwright and Crompton inventions. The machines employed today work automatically and are of great size, carrying sometimes as many as 1,300 spindles. Such a machine, requiring as operatives only one skilled workman and two assistants, is able to produce 5,000,000 yards of thread in one day.

Spinning Jenny. See HARGREAVES; SPINNING.

Spinning-Mule. See CROMPTON.

Spinoza, spe-nō′zä (1632-1677), a Dutch philosopher. He was of Jewish descent. His parents fled from Portugal to escape persecution. He was born and educated at Amsterdam. He became noted for his views as a thinker in the field of philosophy. Though offered a professor's chair at Heidelberg, and later a pension by Louis XIV, he preferred to support himself by his trade of lens making. He lived a lonely, frugal, gentle life. In the history of philosophy he follows Descartes and precedes the German philosophers Fichte, Hegel, etc. His writings are credited with having exerted a peculiar influence on the thought of Goethe and Schiller. His theological views were pantheistic, that is to say, instead of denying the existence of God, he asserted that whatever is, is God.

Spiraea, spī-rē′a, a genus of plants belonging to the rose family. There are about fifty species found chiefly in the north temperate zone. Various species of the United States are known as meadow-sweet, hard hack, queen of the meadows, goat's beard, steeple bush, bridal wreath, ninebark, etc. The flowers occur usually in ornamental clusters or panicles, white, pink, or rose colored. Several species are valued as dooryard shrubs.

Spiritualism, the belief that the spirits of the dead hold communication with the living, by means, usually, of physical phenomena. Spiritualism designates simply the theory that mediumistic phenomena are the work of spirits, and does not imply any religious belief whatever concerning the state of such spirits.

Spithead, a roadstead between the Isle of Wight and the English mainland. It is protected by a two-mile line of forts, and is a place of rendezvous for the British navy. It is so well fortified that it has been nicknamed "The King's Bedchamber."

Spitz, a small dog resembling somewhat the shepherd dog. The spitz is a native of Pomerania. The word spitz is German, meaning a point, and has reference to the sharp-pointed muzzle of the dog. The Pomeranian name is spitzhund.

Spitzbergen, a group of islands in the Arctic Ocean, north of Norway, in latitude 76°80' N. The islands were discovered by Dutch sailors in 1596. The name is derived from a number of sharp-pointed mountains. The total area of the group is about 27,000 square miles. The coasts resemble those of Norway, being deeply cut by fiords. The interior is occupied by glaciers. Tourist steamers call regularly during the summer season. The midnight sun hangs even higher here than in northern Norway. It remains above the horizon for a period of over four months. The islands are frequented by walrus and whale hunters, but are not permanently inhabited. The climate is tempered by the Gulf Stream. There are about 100 flowering plants. Foxes, polar bears, and reindeers are found. Walruses and seals inhabit the coast. The rocky cliffs are occupied by myriads of sea fowl. Spitzbergen forms the basis from which Nordenskjöld and other Arctic explorers have set out. Coal fields exist. These are mined and owned by Swedish, Norwegian, British and Dutch companies.

Spleen, in human anatomy, an organ situated in the left side of the abdomen in connection with the digestive tract. The spleen has an oblong, flattened form. It is dark red in color and soft in texture. It is extremely vascular, that is to say, full of channels. The spleen is not a gland. It collects no secretion and it gives off none. The corpuscles of the blood in passing through it undergo a change not fully understood. Animals deprived of the spleen have a tendency to become fat and have been known to live for an indefinite period

seemingly in perfect health. The spleen was supposed formerly to be the seat of various emotions, particularly of ill-humor. To vent one's spleen is to show a bad temper—to express ill-will.

Spofford, Ainsworth Rand (1825-1908), a noted American librarian. Spofford was a native of New Hampshire. He was for years a bookseller and publisher in Cincinnati. Prior to the Civil War he was associate editor of the Cincinnati *Daily Commercial,* a position which he resigned to become assistant librarian of Congress. Later he acted as librarian-in-chief. Mr. Spofford is known in the world of letters as a compiler rather than an author. Among the pieces of work credited to him are catalogs of the Congressional Library, *Annual American Almanac, Library of Choice Literature* (ten volumes), *Library of Wit and Humor* (five volumes), and other works of less note.

Spoils System, The, a phrase used to designate a system of appointing candidates to public office as a reward for political service rendered to the party in power. Its antithesis is the merit system, by which persons are selected for public service by reason of their fitness to discharge the duties to which they are assigned. The phrase, "spoils system," probably had its origin in a speech made in 1832 by Senator Marcy of New York in which, speaking of the politicians of the day who were demanding offices for their supporters, he said: "When they are contending for victory, they avow the intention of enjoying the fruits of it. If they are defeated, they expect to retire from office. If they are successful, they claim, as matter of right, the advantages of success. *They see nothing wrong in the rule that to the victor belong the spoils of the enemy.*" See CIVIL SERVICE; JACKSON, ANDREW.

Spokane, Wash., the second city of the state and the county seat of Spokane County, is in the eastern part of the state 339 miles east of Seattle. It is on the Spokane River, and is served by the Northern Pacific, Great Northern, Idaho & Washington Northern, Chicago, Milwaukee & St. Paul and other railroads.

The river valley, narrowed by hills, in which the city is built, is a beauty spot, and in the center of Spokane's business district is Spokane Fall. This is both picturesque and utilitarian, for it is a valuable source of hydro-electric power, developing 25,400 electrical horse power. The river is spanned within the city limits by several concrete bridges.

The manufactories of the city are numerous, and from them issue such varied commodities as lumber products, flour, bricks, furniture, pottery, finished granite and marble, structural iron, cereal foods, jewelry, paper, canned meats and machine shop and foundry products.

The country tributary to Spokane is rich in timber and minerals, and the agricultural produce and live stock of the region are important in the city's commerce.

Spokane is not an old city, and as a result the public and business buildings are for the most part modern in architecture and equipment. The most notable structures are the city, county and Federal buildings, Review building, Masonic Temple, Davenport Hotel, Old National Bank, Protestant Episcopal and Roman Catholic cathedrals, Auditorium and Y. M. C. A. There are 1,939 acres in parks, and there are 14 playgrounds; just outside the city is a United States military post—Fort Wright.

The educational institutions include modern public graded and high schools, parochial schools, St. Stephen's School (boys), Brunot Hall (girls), Academy of the Holy Name, Spokane College, Spokane University and Gonzaga University. The Sacred Heart, the Deaconess and St. Luke's hospitals are the largest.

Spokane was founded in 1872 under the name of Spokane Falls. In 1881 the Settlement was incorporated as a city, and in 1883 the first railroad—the Great Northern—reached the city. Thereafter the growth was unusually rapid. In 1900 there were 36,848 inhabitants, while in 1920 there were 104,437.

Sponge, a marine animal found attached to rocks at the bottom of warm seas. Simple fresh water sponges may be found on logs and stones in our lakes and rivers. Sponges are taken by rakes dragged from a boat or by divers, after which they are prepared for the market. A fine sponge the size of a plum may be worth several times

as much as a large, coarse one the size of a muskmelon.

The island of Aegina is the center of the Mediterranean sponge fisheries. A collecting outfit consists of a small sloop for several men. First of all, there is the captain. Three divers in armor take turns in descending. Two men in charge of hose and an air-pump drive air to the diver. A third man holds the life cord by means of which the diver gives signals. The diver fills his lungs repeatedly, closes his armor, seizes a twenty-five pound slab of marble to give himself increased weight, and plunges boldly down to a depth of anywhere from fifteen to forty fathoms. He works hastily, tearing the sponges from the rock and cramming them into a bag carried in front of him like a workman's apron. He is able to remain at the bottom about two minutes. He then gives a signal and is drawn to the surface. The Greek sponge fisher does not like to work for wages. He prefers to be paid according to his catch. London merchants purchase most of the sponges from the Mediterranean and Red Sea fisheries. The city is the world's headquarters for sponges.

The Bahama sponge fisheries are of importance. The headquarters of the Bahama fisheries are on New Providence Island. These fisheries are also under British management. It is estimated that 500 vessels and 3,000 men find employment, and that $150,000 a year is paid out in wages. The waters are so clear that the sponges may be seen on the bottom sixty feet below.

Key West and Tampa Bay, Florida are centers of the American sponge fisheries. The fishers are mainly negroes. They go out in a sloop and pair off, two and two in rowboats. One man kneels in the stern with a water glass. When he sees a sponge on the bottom, he signals to the rower to stop. He pulls off the sponge with a three-pronged hook at the end of a slender pole from twenty to fifty feet in length. Incredible numbers of sponges are brought ashore. They form piles like haystacks in a meadow. Florida sponges of the best quality sell as high as five dollars a pound. Of late the American waters have been invaded by Greek fishers. In 1921, 92,681 pounds were exported, valued at $121,318.

Spontaneous Combustion, burning without the application of fire. The fact that phosphorus at a comparatively low temperature will burst into flame is well known. A slow oxidation takes place at a low temperature, generating heat until rapid combustion ensues. Fresh charcoal, especially when soaked with oil, and soft coal, if wet and containing pyrites, often catch fire of themselves. Piles of rags, waste, or sawdust saturated with oil or varnish, oxidize till they actually burn. Stacks or barns of wet or newly mown hay ferment till the temperature is raised to the igniting point. Stories are reported of the spontaneous combustion of the human body, and many first-class stories are based upon this supposed possibility. Scientists generally agree that the dead body of a fat man who has been strongly addicted to alcohol might so burn, but that this could hardly occur with a living body.

Spool, a small cylinder of wood or other material on which to wind yarn or thread. The cylinder is provided with a projecting rim at each end to prevent the turns of thread from slipping off. Wooden spools, of a single piece are turned in a lathe.

Spoonbill. See DUCK.

Spores, the tiny reproductive bodies of flowerless plants. Most spores are no larger than from twelve one-millionths to six one-millionths of an inch in diameter. Spores may be produced by simply growing out of plant tissues, or may be the result of a fertilization process. As an instance of the latter method, we may take certain algae, or tiny water plants which grow as long threads in the water of ponds and shallow streams. A single thread develops, besides ordinary vegetable cells, egg cells and sperm cells. The sperm cells break away from their enclosing wall and unite with egg cells, so fertilizing them. A thick wall is then formed around each egg cell, which is then a resting spore, ready to withstand the cold of winter, and to develop into a new plant in the spring. The common mold which appears on jelly, bread, and other damp substances, produces resting spores by a somewhat similar process, but bears also millions of tiny bodies which can grow immediately into other mold plants without fertilization. These

float about in the air in great numbers, and wherever they find the right conditions of moisture and temperature, give rise to a crop of mold. Mushrooms produce spores in various ways. The brown dust of the puff-ball is composed simply of millions of spores. The ordinary cap mushroom or "toad stool" produces spores under the cap. The brown spots on the under sides of fern fronds are collections of tiny spore cases. Fern spores do not give rise to new fern plants immediately, but to small, heart-shaped, leaf-like bodies called prothallia. Each prothallium produces on its under side two kinds of organs, one of which forms the egg cell and the other the sperm cell. A drop of water will carry the sperm cells to the egg, which, when fertilized thus gives rise to the leafy fern. As the latter part grows it absorbs the prothallium. A spore consists usually of a bit of protoplasm, a reserve food supply of starch or oil, and an outer wall. Spores are found in one form or another throughout the plant world, and form a fascinating part of the study of botany.

Spotsylvania Court House, Battle of, a battle fought during the Civil War, in May, 1864, near Spotsylvania Court House, a small village in Virginia, about fifty miles from Richmond. The battle took place between the 7th and 21st of May, between a Federal force, under command of Meade, and the Confederate army of northern Virginia, under Lee. The Battle of the Wilderness had just been fought, and General Grant had ordered a march around Lee's right wing to Richmond. Lee, however, had anticipated this, and was waiting for the Federal army at Spotsylvania before Grant arrived. The battle was begun by General Hancock of the Federal forces on May 7, and it continued with more or less intensity until May 21. The Federals fought desperately, and it was during this campaign that General Grant sent his famous dispatch: "I propose to fight it out on this line if it take all summer." The Federal losses were 16,141; those of the Confederates were much less, though the exact number is not known.

Sprat. See HERRING.

Spraying, a method of protecting vegetables and fruit trees against injurious insects. A number of liquid sprays are recommended. Some of the best known are: Paris green, 1 pound, water, 250 gallons; blue vitriol, 1 pound, quicklime, 1 pound, water, 12 gallons; white hellebore, 1 pound, water, 50 gallons; kerosene, 2 gallons, water, 1 gallon, hard soap, ½ pound. Various methods of application have been employed. A long whisk broom, a knapsack fire extinguisher, a pail force-pump, a garden barrel-pump, a two-horse field tank with a pump driven by cog wheels, and finally, in large orchards where thousands of dollars' worth of fruit are dependent on the extermination of insects, a huge tank with a steam pump may be found in use. In all these cases the operator is able to direct the spray through a nozzle as in sprinkling lawns. Insects wage perpetual warfare with fruit raising, but American ingenuity is equal to the emergency. See SCALE; INSECTICIDES; BORDEAUX MIXTURE.

Spring, a current of water issuing from the ground. Springs originate from surface water as rain or snow. The water soaks through the ground until it comes to a layer of rock or impervious earth. This it follows along until it comes to an outlet as at the foot of some cliff. Sometimes the source of a spring must be sought in mountains or uplands a thousand miles away. The mountains of New England and the Appalachian region generally are noted for delightful springs of fresh, cool water. In their underground journey, spring waters absorb mineral elements from the earth. If strongly impregnated, they are known as mineral springs. Saline springs contain salt; sulphur springs, compounds of sulphur; chalybeate springs, iron; calcareous springs are hard with limewater, and so on. Springs that flow only at intervals are known as intermittent. Their sources are usually near by. They are dependent on seasons of rainfall. An artesian well may be regarded as an artificial spring formed by piercing an overlying layer of rock or earth so as to permit the outflow of water. When the waters pass over hot rocks they form hot springs. See YELLOWSTONE PARK; GEYSER; SPA; WATERS, MINERAL; AACHEN; BADEN; HOT SPRINGS; FLORIDA.

Spring, the season of the year which follows winter and precedes summer. As-

tronomically, spring extends from March 21 to June 21. Industrially, it is the season of planting. Children rejoice in the spring, the season of the first flowers, of lambs, nestlings, and young animals. Older people rejoice in the autumn, the season of harvests and fruits. In case of a late, cool spring it is said that "winter lingers in the lap of spring." In Australia, New Zealand, South Africa, Argentina, and other countries of the southern hemisphere, spring comes at the season corresponding to the northern autumn. See SEASONS.

Springbok. See ANTELOPE.

Springfield, the capital of Illinois, located near the center of the state in a rich farming region. The whole country around is underlaid with a thick vein of bituminous coal and many extensive mines are worked in the immediate vicinity. Some of the more important manufactures are watches, engines, boilers, foundry and machine shop products, agricultural implements, paving brick, and shoes. This city was the home of Abraham Lincoln when he was elected president, and the house where he lived is under state control, and open to the public. The Lincoln National Monument is located near the city in beautiful Oak Ridge Cemetery; in the mausoleum are the remains of the martyr president, his wife, and two children. The capitol, a very imposing structure, is built of limestone, its dome being one of the highest in the United States. Other interesting and attractive buildings are the historic court house, for many years the capitol, where some of the most famous speeches of Lincoln and Douglas were made; the supreme court building; the state arsenal; the Lincoln library; and the extensive buildings of the Illinois State Fair Association; also the State Historical Library, the Illinois State Museum of Natural History, the Supreme Court Library, the Governor's Mansion, the Odd Fellows' buildings, the Orphanage of the Holy Child, the Springfield and St. John's hospitals, and the David Prince Sanitarium. Springfield has a modern and adequate school system, and many private institutions of education, such as the Bettie Stuart Institute (female), Concordia Seminary, St. Agatha's School, and the Academy of Our Lady of the Sacred Heart.

Springfield is situated in a rich farming and coal-mining region, and horse-breeding is an important industry. The Illinois Watch Company has a large and flourishing establishment here. This city adopted the commission form of government in 1911. The first settlers came here in 1819, the city was laid out in 1823, incorporated as a town in 1832, and chartered as a city in 1840. In 1837 it was chosen as the state capital, and the state legislature met here for the first time in 1839. Pop., 1920, 59,183.

Springfield, a city in Massachusetts, on the Connecticut River. It is a beautiful city with extensive parks and handsome buildings. In Forest Park, which comprises 464 acres, is a collection of birds and animals. From the higher ground of the city can be obtained wide views of the beautiful Connecticut Valley. A statue by St. Gaudens, "The Puritan," others of Miles Morgan and William McKinley, a fine Museum of Science, a Museum of Art housed in a beautiful Renaissance building, a large railway station and the Church of the Unity are points of interest. It is the seat of a famous United States armory and an arsenal, which produces about 1,350 rifles a week for the use of the army. There is an artistic group of municipal buildings, costing over a million dollars. There is also a private manufactory of fire-arms; other manufactures are railroad cars, skates, sporting goods, packed meats, valves and hydrants, automobiles, motor-cycles, organs, art goods, cigars, paper, soap, etc. Located there are the American International College, the International Y. M. C. A. Training School, a great evening trade school, and an excellent system of public schools. *Webster's Dictionary* is published at Springfield, and the Phelps Publishing Company is also located here.

Springfield is a port of entry and has some foreign trade connections. The government is composed of a mayor, elected annually, and a council. Large sums have been spent by the city to make its public utilities modern and in line with the latest developments. The water system is owned and operated by the city. Springfield was first settled in 1636. Until 1640 it was

called Agawam. On Oct. 4, 1675, during King Philip's War, it was attacked by Indians and burned, and later was the scene of several sharp skirmishes between the state and insurgents. Population, 1920, 129,614.

Springfield, a city in Missouri, on the ridge of the Ozark Mountains. It is the chief wholesale center for southwestern Missouri. The city has eleven banks. Its manufactories include railroad shops, iron works, machine shops, wagon and carriage factories, flour mills, and breweries. There are a number of good public buildings, two hospitals, and several educational institutions, including Drury College, a state normal school, and Loretto Academy. Springfield was the center of operations for Missouri during the Civil War. General Lyon, in command of the Union forces occupying the city, was killed at the battle of Wilson's Creek near Springfield. It was then occupied by the Confederates who were later driven out by Fremont's men. After several other charges it was held finally by Federal troops. Confederate and Federal cemeteries are located near the city. The population in 1920 was 39,631.

Springfield, in Ohio, a city at the confluence of the Mad River and Lagonda Creek. Several railroads center there, and it has excellent electric connections with Columbus, Dayton, Troy, and other neighboring cities. Springfield is noted as a manufacturing city, producing reapers, harvesters, drills, cultivators, threshers, engines, road-rolling machines, wind, gas and gasoline engines, pumps, electric motors, flour, rubber goods, lime, etc. It has also large greenhouses, and several publishing houses. Snyder Memorial Park, a number of handsome public buildings, Wittenberg College, a public library, and the state homes of the Masons, Odd Fellows, and Knights of Pythias orders, are points of interest. The population in 1920 was 60,840.

Spring Hill, Nova Scotia, a town in Cumberland County, is on the Cumberland Railroad & Coal Company's road, 5 miles south of Spring Hill Junction. The town is favorably situated in the heart of practically inexhaustible beds of bituminous coals of the best quality, and with excellent transportation facilities by land and water. It is also the center of an excellent farming and lumbering district about an equal distance from the outlying towns of Parrsboro, Pugwash and Amherst. Its situation is healthful (700 feet above sea level) and it is bounteously endowed by nature with resources to maintain a large population. Notwithstanding some labor difficulties its progress has been gradual and uniform since the opening of the mines in 1874, and it is now entering upon an era of increased prosperity and peaceful relations between labor and capital. Its civic administration has been distinctly conservative, the civic bonded debt, outside of waterworks, being only $21,000 and of the present issue $4,000 is for the purpose of renewing short term loans for that amount included in present indebtedness. Population, 1921, 4,958.

Sproule, Thomas Simpson (1843-), a Canadian physician and statesman, was born in York County, Ontario, and was educated at the University of Michigan and at Victoria University, Cobourg. For a short time Dr. Sproule practiced medicine in Michigan, but after his return to Canada he took an active part in politics. In 1878 he was elected to the Dominion Parliament as a Conservative from East Grey, and this constituency he represented until 1911. In the latter year he was made speaker of the House of Commons, and was appointed a member of the Senate in 1915. Dr. Sproule was a protagonist of Protestant supremacy in Canada and championed the cause of separate schools for the province of Manitoba.

Spruce, a genus of cone-bearing trees. The spruce belongs to the pine, rather than to the cypress group of evergreens. The cones are at the tips of the branches. The needles are keeled above and below, making them four-sided. They are scattered over the branchlets and point in every way. Spruce timber makes excellent lumber. Most newspapers are printed on paper made wholly or in part from spruce pulp. Bamboo pulp is the chief rival of spruce in paper making. The black spruce is from forty to fifty feet high. The white spruce, a handsomer tree, grows from fifty to one hundred fifty feet high. They are found

from New England to Minnesota and northward. Resinous drops exuding from the bark of the spruce are collected for chewing gum. Engelmann's spruce is one of the finest timber trees of the Pacific Northwest. Under favorable circumstances it attains a trunk diameter of four to five feet, and yet in Alpine situations it becomes a prostrate shrub. Spruce comes from the word Prussia. This appears in spruce-leather and spruce-fir, meaning Prussian-leather and Prussian-fir. From spruce-leather the word spruce was extended to fashionable attire generally. As the name of a tree, spruce-fir was cut down to spruce. The phrase "to look spruce" has reference to foot-wear and dress, not to the trim, correct appearance of the tree. See PAPER.

Spurge, spûrj, a large genus of plants, the botanical name of which is *Euphorbia.* The spurges vary greatly in habit. In the eastern part of North America there are a dozen prostrate or spreading spurges, having slender stems like those of the marsh cranberry and small, one-sided, smooth, or hairy leaves shaped like a mouse's ear. They are much more delicate plants than purslane. When a stem or leaf is broken, a drop of white fluid oozes or spurges out. Other American species are erect, perennial herbs. Some of the tropical spurges, especially of Africa, have leafless stems like those of the tree cactus. They are covered with prickly spines. However widely the spurges may differ in appearance their flowers are all small, naked, and inconspicuous. A triangular seed pod, shaped somewhat like a grain of buckwheat, protrudes on a slender stem amid a cluster of greenish stamens. This pod is three-angled, and contains three seeds, often curiously pitted and wrinkled. Once the observer's attention has been directed to the spurges, the entire group will be found full of interest. The triangular stalked seed pod and milky sap are sufficient means of identification. There are about 600 spurges. The Euphorbia family, to which the spurges belong, comprises not less than 3,000 species. They are especially numerous in Australasia. Several plants of the family furnish caoutchouc from which India rubber is made. The castor-oil plant belongs also to this family.

Spurgeon, spûr'jun, **Charles Haddon** (1834-1892), a noted Baptist preacher of London. In 1861 the famous "Tabernacle," seating 6,000 people, was built for him in the thickly settled district south of the Thames. Spurgeon was a power among the working people of London. As he uttered homely truths, heads nodded approval and hearty voices cried "Amen," "Right, brother." It was pretty difficult to maintain so large an establishment without a financial scheme. People who came, not to scoff, but to see, were very properly required to contribute before entering. Spurgeon's sermons—he spoke offhand—were taken down in shorthand, revised carefully by himself, published in weekly numbers, and translated into many languages. They reached a weekly circulation of 30,000. His printed volumes ran well up to 100 in number. Spurgeon was a man of tireless energy. He left a training school for ministers, an almshouse, an orphanage, and thirty-six chapels as memorials of his work for laboring people.

Spy, in time of warfare, a secret messenger sent within the enemy's lines to gather information. A scout goes in his own uniform and, if taken, must be treated as a prisoner of war. The spy travels in disguise, trying to appear what he is not. Sometimes he borrows the uniform of the enemy and passes himself off under false pretenses. According to the laws of warfare the spy may be shot. Major André, it may be remembered, was taken within the American lines at Tarrytown, not wearing his own uniform and bearing dispatches from General Arnold to the British commander. Although claiming protection as a prisoner of war, he was shot by order of the military council and with the approval of General Washington. An officer may send out anyone under his command to scout, but may not require a subordinate to act as a spy. Nathan Hale, an American soldier, suffered a similar fate. See ANDRÉ; HALE.

Squab. See PIGEON.

Squash, a member of the gourd family closely related to the pumpkin and less so to the cucumber and watermelon. The blossoms are of two kinds,—those with pollen and those with young fruit. Squashes

are of two types. The crooknecks or bush varieties are usually American, though the winter crookneck is probably from eastern Asia. The other type with long running vine is American. It is well represented by the Hubbard squash. If the younger squashes be removed, leaving but few on a vine, the fruit will be larger. The Hubbard is the best keeper. To insure keeping, the stem should be cut, not broken off, and the fruit should be left in the sun until the end of the stem is dry. The enemies of the squash — bugs and cutworms — are so determined and so difficult to kill except by hand work that three or four times as many seed should be placed in a hill as are desired. It is an easy matter to thin them out later. The name—squash—is of American Indian origin. Botanically, the squash, like the pumpkin, is a large, hollow berry. See GOURD; PUMPKIN.

Squash Bug, an insect pest which attacks squash and pumpkin vines. The eggs, which are large and of a golden-brown color, are laid on the leaves in the spring by the mature bug which has come out from hibernation. The young bugs are scarlet; they shed their skin five times, each time appearing darker, until the mature bug is a dark brownish gray, and a half-inch to an inch long. There are several ways of fighting them. One is to pick the bugs by hand before the eggs are laid. A second is to start some vines very early to attract the bugs and then spray the vines with kerosene. Probably the best plan is to destroy the vines and undeveloped fruit after the ripe fruit has been gathered. The insects injure the vines by sucking the juice through their sharp bills.

A small cylindrical beetle is often called the squash bug also. It is known by the black and yellow longitudinal stripes on the wing covers.

Squatter-Sovereignty. See DOUGLAS, STEPHEN ARNOLD.

Squeers, Wackford. See NICHOLAS NICKLEBY; DOTHEBOYS HALL.

Squid, a marine animal allied to the cuttlefish. The calamar, or squid, has ten arms, two of which are longer than the others. The body is elongated and tapers toward the posterior end. Near the posterior end are two fin-like flaps of skin, one on each side. Inside the body is a narrow, pen-shaped shell, which is somewhat horny but very easily bent. The squid, like the cuttlefish, is able to squirt a dark colored fluid about in the water, to the confusion of its enemies. It lives in temperate as well as in warm regions of the ocean. It is represented by several groups of species. The smallest squid is not to exceed an inch in length. The giant squid has an arm spread of fifty feet. The common squid reaches a length of two feet or more. It is bluish or purple in color. In the Mediterranean is found a species which, when full-grown, is about ten inches in length, and white, almost transparent in color. When frightened or captured it assumes a delicate pink or rose color, the tints being deepest over its back or dorsal side. The fins are used in swimming rapidly through the water, and it seems a creature of almost unearthly beauty, so delicate is its form and color. Squids are found in great numbers along both shores of North America. All squids are fish eaters. They hunt at night; darting backward into a school of mackerel like arrows, they create havoc. See CUTTLEFISH; OCTOPUS.

Squill, a plant of the lily family. Squills are related to the hyacinth and camass, and more remotely to the leek and onion. There are about eighty species, all stemless plants from onion-like coated bulbs. Several species are known as wild hyacinth. One kind is known in England as the bluebell. A sirup pressed from the bulb of one species is a well known remedy. Flowering squills are reared like the hyacinth and lily-of-the-valley as early blooming plants. There is a wide range of colors, as white, blue, purple, and pink. The chief species appear to be of Mediterranean origin. Others are from Japan, the Philippines, Peru, Java, etc.

Squire. See CHIVALRY.

Squirrel, skwĕr′rĕl, a bushy-tailed animal with active habits, living largely on nuts and other seeds. The name is from an old Latin word, and means a little fellow with a shadowy or shady tail. True squirrels live among trees. Their claws are suited for climbing and for clinging to stems and branches. In jumping, the tail floats out long and broad like a rudder. It en-

ables its owner to hold his course or to swerve this way or that if in the meantime a desired branch has been swayed by the wind. If necessary to leap from a great height the squirrel jumps off, spreading out all fours to the utmost extent, and works its arched and flattened tail in a position to strike the air and retard the downward speed. A squirrel can leap fifty feet to the ground. John Bourroughs quotes an American traveler in Mexico to the effect that he saw a large black squirrel leap 600 feet from a cliff to escape from captivity. The animal fluttered slowly down, and lit on a ledge of limestone, combed its fur, took a drink, and made off into a thicket with a triumphant flourish of the tail that had served it in so great a need. "I have no doubt," adds Burroughs, "that our red squirrel would have made the leap safely."

The squirrel's teeth are adze-shaped, with sharp cutting edges admirably adapted to chisel their way through the shell of a nut. This the squirrel accomplishes while sitting up with its bushy tail following the curve of the back. It holds the nut up to its mouth with its front paws, and gnaws away, or else it holds its jaws stationary while it twirls the nut round and round against the teeth. The squirrel is an adept at knowing just where to cut a hole and how to extract the meat with the smallest possible hole. The intricate meat of a walnut, for instance, is gotten out somehow through a surprisingly small hole not much larger than a pea.

Squirrels are famous for their custom of providing in season of plenty against a time of want. In the autumn they store away a supply of nuts and seeds in hollow logs and holes in trees, or bury them one by one in the leaves and forest mold. How it is done no one can say, but after a snowfall which certainly obliterates all tracks and cuts off scent, a squirrel will scamper out into an untrodden patch of fresh snow and dig down straight to a nut without the slightest hesitation; then back again to a limb for its breakfast.

The squirrel usually sleeps and nests in hollow trees or often, especially in young timber where hollow trees are rare, a nest as large as a bushel basket is constructed of leaves, twigs, and grass in the crotch of a slender tree. The food consists of almost any kind of nuts,—walnut, beech, hickory, or hazel, according to locality, acorns, the seeds of the maple, ash, pine, grain from the farmer's bin or crib, and it must be confessed, the eggs of birds, though many a squirrel has had the worst of it when caught in the act by angry beaks.

The one squirrel of Europe is much like our common red squirrel or chickaree. North America is the favorite home of the squirrel. The red squirrel, the mischief-making *meeko* of the Northeastern Indian, and the chattering *adjidaumo* of Hiawatha, is found from the Ohio Valley and Pennsylvania to the northern limit of timber. The gray or black squirrel, varying in color according to locality, is found throughout North America east of the plains. The fox squirrel which attains a length of over two feet, tail included, also varies from gray to jet black. It is found from the latitude of Massachusetts southward. The Pacific States have two species. Mexico and Central America have a number. South America has but one. Australia has none.

The term squirrel has a wide application. When taken from the water the squirrel-fish gasps with a noise like the bark of a squirrel; squirrel-tail is a common name for wild barley; the squirrel-hawk is a reddish, rough-legged western hawk that preys on ground squirrels; squirrel-corn, so called from its grain-like tubers, is not corn but a pretty spring flower related to the Dutchman's breeches. A squirrel-bot is a fly whose larvae burrow in the hide of squirrels.

For other animals of the family, see articles on CHIPMUNK; GOPHER; FLYING SQUIRREL; PRAIRIE DOG; WOODCHUCK; RODENTS.

Stabat Mater, stā′băt mā′tẽr, a noted Latin hymn of the Middle Ages. The name is taken from the first two words of the hymn, beginning:

Stabat mater dolorosa
Juxta crucem lacrymosa
Dum pendebat Filius.

"The sad mother stood by the cross weeping, whilst her son hung there." The authorship is not known certainly. The hymn was placed in the Roman missal to be sung at the feast of the Seven Sorrows of Mary.

It is universally acknowledged to be one of the finest metrical compositions in any language. It is famous for beauty both of language and of thought. See HYMN.

Stadium, a Greek measure of distance. The word is akin to stand and station. The Greek race course was supposed to be an exact stadium in length. Measurements of the stadium at Athens and that at Olympus and other Greek cities show that the official stadium was from 603 to 610 feet in length, or equivalent to an English furlong. The Romans used the same unit of length, eight of which made a Roman mile.

Staël, stäl, **Madame de** (1766-1817), a French author and one of the most celebrated women in all literature. She was the only child of Jacques Necker, Swiss minister of finance to Louis XVI. Her full name was Anne Louise Germaine Necker. At the age of twenty she married Baron de Staël-Holstein, the Swedish ambassador at the French court. He was much older than she and the marriage did not prove a happy one. After a few years the couple separated. As a child Madame de Staël showed a remarkably powerful intellect, which was stimulated and encouraged by the eminent scholars of the day, who gathered weekly in the Salon of Madame Necker. Her first work was *Sophia*, a comedy published in 1786. She attracted attention for the first time by the publication of a eulogy upon Rousseau.

The Revolution aroused at first the profound sympathy of Madame de Staël, but a reaction of horror set in at its later enormities. She attempted to aid in a secret scheme for securing the royal family an opportunity to flee to England, wrote a powerful *Defense of the Queen,* and set forth her views concerning the Revolution in other writings. Madame de Staël continued to write and to take a constant interest in public affairs. In some way she incurred the enmity of Napoleon, perhaps because from the first she distrusted his designs. Napoleon appreciated evidently the force of her influence, for she was forbidden to live in Paris, and in 1802 was banished from France. About this time she published a work which added largely to her literary reputation, *Literature Considered in Its Relation to Social Institutions.* She traveled widely during the period of her banishment, and in 1813 published a work on Germany thought by many to be her greatest production. At the time of the Restoration she returned to Paris. Madame de Staël was the author of several novels. Among them *Corinne* and *Delphine* are perhaps the best known although they are now little read.

Staff Military, a body of officers attached in an advisory or executive capacity to a commanding officer. In the United States in time of war each military unit larger than a company has its headquarters and staff. The staff officers of a regiment attend to all details pertaining to the routine, equipment and discipline of the regiment, and see that the orders of the commanding officer are carried out. The personnel of a staff depends upon the unit to which it is attached. It is obvious that an army corps would require a larger staff than a division, and that a division would require a larger staff than a regiment.

GENERAL STAFF IN THE UNITED STATES. The General Staff was created by act of Congress in 1903. It consists of the Chief of Staff, who is at the head of all departments of the army and is responsible only to the President, and the following members, who are responsible to the chief: the military secretary, quarter-master-general, inspector-general, chief of engineers, chief of ordnance, judge-advocate-general, chief signal officer and chief of the bureau of insular affairs. The chief of staff is the commanding officer of the army. See ARMY, subhead *Army of the United States.*

Staffa. See FINGAL'S CAVE.

Stag Beetle. See BEETLE.

Stage, in the presentation of drama, the platform of scaffolding upon which the play is performed. In the earliest form of Greek tragedy the stage was a table upon which the one actor stood. As the drama developed and regular theaters were constructed, the stage was built at the foot of a hill in the side of which seats were cut for the spectators. The stage was the only part of the theater roofed over.

In the time of the English miracle play the stage was at first only a rude scaffolding erected in a church. As the church failed to accommodate the crowds the stage was

erected outside. Gradually the pageant or stage on wheels came into use. For a private performance a platform was erected in one end of the castle hall. For the stage in Shakespeare's time, the reader is referred to articles entitled THEATER and GLOBE THEATER.

In modern theaters the stage includes not only that part visible to the spectators, but the spaces on each side behind the proscenium arch used for shifting the side scenes. The stage is divided laterally into five parts for the convenience of the actors and managers. These divisions are known by various names. See THEATER; DRAMA; SCENE.

Stamford, Conn., an industrial city, is on Long Island Sound and on the New York, New Haven & Hartford Railroad, 33 miles northeast of New York City. The harbor here admits large Sound vessels. In Stamford are made the famous Yale locks; other manufactures are hardware, pianos, typewriters, dyestuffs, pottery, insulated wire, chemicals, hats, shoes and patent medicines. It contains modern public schools and two libraries. The population was 35,486 in 1920.

Stammering, a defect of speech, due, it is now thought, to a want of exact connection between certain nerves and their appropriate muscles. It was thought formerly that stammering and stuttering, which is really akin to it, were caused by some malformation of the organs of speech; but investigation does not support this theory. Some sounds are harder to utter than others. T and S sounds, if any, are likely to occasion hesitation in speech. A recent writer states that stammerers are common throughout the British Islands and among all English-speaking people, in Germany and in Scandinavia, but are almost unknown in Italy and France. He raises the question whether the greater difficulty of uttering the Anglo-Saxon speech, as compared with the soft speech of southern Europe, may not be one of the causes of stuttering. Speaking in rhythmic movement in time with some musical instrument, as well as diverting the mind by waving the arms, are suggested as helpful to the stuttering speaker.

Stamp Act, an act of Parliament passed March, 1765, to go into effect November 1st. It imposed "certain stamp duties, and other duties, in the British colonies and plantations in America, toward further defraying the expenses of defending, protecting, and securing the same." The act required that stamps purchased of the British government and costing from six cents to fifty dollars each be affixed to certain legal documents, as bills of sale, deeds to real estate, wills, licenses, commissions, and that almanacs, advertisements, pamphlets, newspapers, and playing cards should be printed on stamped paper sold by the government. Parliament proposed to send 10,000 troops for defense against the French and Indians. The tax was expected to yield about $500,000 a year and would pay perhaps a third of the military expense in view.

The act aroused bitter opposition. "If they have the right to impose a stamp tax," said one writer, "they have a right to lay on us a poll tax, a land tax, a malt tax, a cider tax, a window tax, a smoke tax; and why not tax us for the light of the sun, the air we breathe, and the ground we are buried in?" "I will never carry on Business under such great disadvantages and Burthen. I will not be a slave, I have a right to the Libertys & Privileges of the English Constitution, and I as an Englishman will enjoy them," said John Hancock. Patrick Henry, the magnetic patriot of Virginia, introduced ringing resolutions, concluding: "That every attempt to vest such power in any other person or persons whatever than the General Assembly aforesaid, is illegal, unconstitutional, and unjust, and has a manifest tendency to destroy British as well as American liberty."

A congress known as the Stamp Act Congress met in New York, October 7, 1765. It was attended by delegates from nine colonies. A dignified petition was drawn up and was sent to the British government. It stated in a formal way "the most essential rights and liberties of the colonists, and of the grievances under which they labor," insisted on the principle of "No taxation without representation," and prayed for the revocation of the act. In the meantime organizations known as Sons of Liberty had found a way of touching the British pocketbook by encouraging a general boycott of

British goods. Thomas Hutchinson, the inoffensive lieutenant governor of Massachusetts, who opposed the passage of the bill while pending in Parliament, made preparations, as his office required, to set the act into effect. A Boston mob fell upon his home, sacked and plundered it, and put the lives of himself and family in danger. Officials were terrorized elsewhere.

When November 1st, the day stamps were to be used, arrived, not a stamp was in sight. The people went about their business as usual. The act was ignored. In Parliament, William Pitt pleaded the cause of the colonists: "We may bind their trade, confine their manufactures, and exercise every power whatsoever, except that of taking their money out of their pockets without their consent." Said he, "You have no right to tax America. I rejoice that America has resisted. Three millions of our fellow-subjects, so lost to every sense of virtue as tamely to give up their liberties, would be fit instruments to make slaves of the rest."

Parliament passed a resolution declaring that the colonies were "subordinate unto, and dependent upon, the Imperial Crown and Parliament of Great Britain which had full power and authority . . . to bind the Colonies and people of America, subject of the Crown of Great Britain, in all Cases whatsoever." March 18, 1776, the Stamp Act was repealed by the British Parliament.

Stamp Mill. See GOLD.

Standard, an ensign or flag around which men rally in times of war; also, and in a broader sense, the emblem of a nation or ruler. Standards were carried in remote times, the Bible mentioning those carried by the Jews to mark off their divisions and subdivisions. The ancient military standard consisted of a symbol carried on a pole like the Roman eagle.

In the United States, the term standard is understood as meaning the national and regimental silk flags which are carried by regiments of cavalry and field artillery. The President's flag is a blue field with the national coat of arms in colors. The same flag with a white field is used by the Vice-President, while that of the Secretary of War is of scarlet bunting, having the coat of arms in the center and a five-pointed white star in each corner. All foreign countries have standards which display the national colors and coat of arms.

Standard Oil Company, a vast business combine that originated in the firm of Rockefeller, Andrews and Flagler in 1867. This firm was interested primarily in petroleum and its products; but when, in 1870. the firm name was changed to the Standard Oil Company of Ohio it did not control more than 10 per cent of the American petroleum industry. Rockefeller and his business partners had interests in other companies dealing in petroleum, however, and by 1880 the Standard Oil Company had a 90 per cent control. This was gained in part through petroleum transportation activities and in part through the efficiency of the firm's organization. Two years later a still larger combination was effected, when the total stocks of 14 companies and the majority holdings of 26 others were united under the name of the Standard Oil Trust and placed in the hands of nine men. Of $70,000,000 worth of trust certificates, the nine trustees owned $46,000,000 worth. Because of the nature of this huge combine, it came into conflict with the Ohio courts; and though after, and because of, an unfavorable court ruling the company was reshaped, the ends attained were the same. In 1899 the Standard Oil Company of New Jersey, a holding company, was organized, with a capitalization of $110,000,000.

Tried under the Sherman Anti-Trust Law in 1906, the Standard Oil Company was convicted and ordered dissolved in 1909; the Supreme Court in 1911 sustained the lower court, giving the firm six months to plan its dissolution. This was the beginning of the Standard Oil subsidiaries in which the company now exists. The earnings of this firm are no doubt the largest in the United States, but exact figures cannot be obtained.

Standard Time, an arrangement made by common consent whereby large districts keep the same time. Standard time has been agreed upon to meet the necessities of large east and west railroad systems. Briefly stated, the railroad world has been

laid off into rough-edged belts running north and south. All timepieces in the same time belt are set to run together to a second. The time of each belt is an hour slower than that of the belt next east of it. Greenwich, England, time is the basis. All watches and clocks in the British Isles are expected to keep time to a tick with the great government clock in Greenwich Observatory. The continent of Europe, Russia not falling in with the agreement, uses uniform time one hour faster than that of England. Australia lies in three time belts. Western Australia uses time eight hours faster than Greenwich time; Japan and South Australia, nine hours; Eastern Australia, ten hours. North America lies in five time belts. Beginning at the east, they are the Colonial, the Eastern, the Central, the Mountain, and the Pacific. In these belts timepieces are slower than Greenwich time by precisely *four, five, six, seven,* and *eight* hours respectively. The minutes and the seconds are the same the world over. In practice Mountain time is pinched out on the southern border. The Southern Pacific Railroad changes from Central to Pacific time at El Paso.

Under the system of local time, on the contrary, it is 12 o'clock at any particular place when the sun hangs highest in the heavens and objects cast their shadows in a north and south line. Twelve o'clock travels westward with the sun. We can see readily how difficult it would be to operate trains on a long east and west road by local time. The astronomical or local time of New York City, and that of Pittsburg differ by about an hour. Trains have orders to leave New York and Pittsburg at, let us say, 7 A. M. to meet at 12:30 at a particular siding. Now are they to meet at 12:30 by New York time or by Pittsburg time, or at 12:30 according to local time? A freight is ordered to sidetrack for an eastbound passenger at 9:30 A. M.; for a west-bound passenger at 10 A. M. If the freight is to turn out for the west-bound train on time brought from New York and for the eastbound train on time brought from Pittsburg, the 10 o'clock siding must be taken before the 9:30 siding is reached. To avoid all possibility of confusion, Standard time has been adopted. Every time-piece connected with the service between New York and Pittsburg and in all Eastern territory, is set to the click of a telegraph instrument to indicate the same hour, minute, and second. No matter which way an employe is going or what branch of the service he may be in, he is required to exhibit his watch daily or weekly to some authorized jeweler whose chronometer is in telegraphic circuit and who certifies to the company that the employe is carrying correct time.

Under the Standard System, time changes by hourly leaps. Referring again to Pittsburg, which is on the boundary line, it is 12 o'clock Standard in the eastern part of the Union Station when it is eleven in the western part of the station. A train from the east may arrive at 7 P. M., Eastern time, and go on westward without loss of time at 6 P. M. Central time. Men working for the Eastern lines carry Eastern time, and men working for Western trains carry Central time. In a town so situated, local confusion is a serious question. In fixing an hour for the opening of school, it is necessary to state whether Eastern, local or Central time is meant. It is thought that the difficulty will be solved some day by a world-wide adoption of, very possibly, Greenwich time, so that all timepieces the world over may indicate the same hour.

Another difficulty in time is that of establishing dates. If one were to start westward from Greenwich at noon on Monday and keep up with the sun, he would be back at Greenwich having had noon of Monday all the while, but to the people of Greenwich, it would be Tuesday noon on his return. Even though the traveler took months to make the trip, he would find himself a day behind in his reckoning. On a trip around the world westward, the traveler must add one day of the week and month, calling Friday the 15th Saturday the 16th, for instance. Traveling around the world eastward, he would arrive at his starting place with his dates a day ahead of his friends at home. On going around the world eastward, he must drop out a day, and set aside two days for one date in order to be in accord with local dates on his return. The locality for adding a day

or subtracting a day is by common consent the meridian of 180° east or west from Greenwich. This line passes north and south through the Pacific Ocean, and is called the international date line. Pacific steamers make quite a point of celebrating passing the line. Islands near the line exercise the privilege of dating according to whether their affiliations lie east or west. When Alaska, which had its datings from Russia, passed into our possession, it was necessary to drop a day out of the week in order to make the days correspond with those of America rather than with those of Asia. Up to 1844 Manila kept Monday on the day that Hong Kong observed as Sunday. The story is told of three London sea captains who dined together in the Strand. The first, who had sailed around the world westward, called the day Saturday. The second, who had just returned from a similar voyage eastward, claimed to be eating his Monday dinner. The third who had stayed at home questioned the propriety of a jollification at all for to him the day was the Sabbath.

Standards, National Bureau of, a bureau organized in 1901, whose duties were designated in general as the responsibility of securing uniformity of weights and measures. The power to fix a standard of weights and measures had been conferred on Congress, but had not been exercised by that body, and the result was that each state used the standards which were legalized for it in colonial days. When the Coast Survey was established in 1815 the need for standardization of measures of length was felt, and the temporary standard selected was the meter bar constructed by the International Metric Company. Gradually the same need was felt for a standard for weights and measures of capacity, because it became apparent that the government was losing money, as it was forced to vary its standards for each state. It was pointed out that such government scientific bureaus were effectively used in Europe; e. g., the Normal Eichungs Kommission and the Kaisirliche Physicalisch-Technische Reichsanstalt in Germany.

Hence, with the approval of manufacturing, scientific, and engineering interests, the National Bureau of Standards was established by act of Congress, and placed under the jurisdiction of the Treasury Department. Its functions were designated as follows: Custody of standards; comparison of standards used in scientific investigations, engineering, manufacture, commerce and educational institutions, with the standards adopted by the government; the construction of their multiples and subdivisions; determining of physical constants and the properties of materials; and the testing and calibration of standard measuring apparatus. The Bureau has a right on the payment of a fee by the applicant. to execute these duties for the various states desiring its services, for municipal governments, institutions, corporations, societies, or individuals.

The first director of the National Bureau of Standards was Prof. S. W. Stratton of the University of Chicago. Upon the establishment of the Department of Commerce and Labor (now the Department of Commerce) in 1903, the Bureau was transferred from the jurisdiction of the Department of the Treasury to the newly organized department. Its buildings are located 3½ miles from the White House in Washington. The work is divided into sections, and a specialist controls the investigations of each section. They are: Electrical and measuring instruments, electrical resistance and electromotive, inductance, capacity, and absolute measurements; thermometry; pyrometry, and heat measurements; magnetism; photometry; weights and measures; polarimetry; spectroscopy; chemistry; radiometry; properties of materials, and engineering instruments.

The purpose of the National Bureau of Standards is to fulfill the need for a center of information on questions of scientific testing and measurement. The manufacturer should be enabled to demand the same help and interest from it that the farmer gets from the Department of Agriculture. Already it has done much to suggest that its researches have practical and scientific value.

Standish, Miles (1584-1656), an American colonist and military leader of the Plymouth colony. He served in the Eng-

lish army in Holland, and there fell in with the Puritans, though he never became one of them. In 1620 he sailed on the Mayflower. His ability as a soldier soon made him a leader, and he is responsible largely for the colony's surviving the first few hard years of its existence. In 1625 he was sent to England to implore the help of the government for the desperate colonists; he failed in his specific mission but returned the next year with food and other supplies. Later he became one of the founders of Duxbury, Massachusetts, where he served as magistrate until his death.

Stanford, Leland (1824-1893), an American financier and philanthropist who founded Leland Stanford Junior University, and by whose efforts many industrial projects in the West were completed, was born at Watervliet, N. Y. After a brief period of schooling and some additional law study, Mr. Stanford removed to Port Washington, Wis., and practiced law there for three years. Going later to California, he was fairly successful in gold mining; but the real basis of his fortune was a mercantile establishment he founded in San Francisco in 1856. In 1861, Mr. Stanford was elected governor of California, was chosen president of the Central Pacific Railroad in the same year, and then successfully urged upon Congress the granting of Federal aid to this giant railroad project. After Mr. Stanford took personal charge of the construction of that part of the road crossing the Sierra Nevada Mountains, he established the record of completing 530 miles of railroad in 293 days. He was United States Senator from California from 1885 to 1891. After this date his largest interest was the university he founded in 1885 to perpetuate the memory of his son, who died at Rome, Italy, at the age of 16. Leland Stanford Junior University is at Palo Alto, California. It is the world's richest university, and is one of the highest in scholarship.

After his death his wife, Jane Leland Stanford (1825-1905), devoted her time to the interests of the university.

Stanhope, Lady Hester Lucy (1776-1839), an eccentric Enlishwoman, daughter of the third Earl of Stanhope. She was unhappy in her own home and so, in 1803, she went to preside over that of her Uncle, William Pitt. Embittered by her loss of power after his death and saddened by many bereavements she left England in 1810 and went to Syria where she lived in palatial elegance until her death. Her rich gifts to Turkish pashas gave her, temporarily, great influence over them and the Bedouins, won by her kindness, looked up to her as a being of a higher order. Her friends included some of the most notable personages of the time. She is "the crazy Queen of Lebanon" to whom Whittier refers in "Snowbound."

Stanley, Arthur Penrhyn (1815-1881), dean of Westminster. He was educated at Rugby. He is the trembling little chap described in *Tom Brown at Rugby,* who, despite the jeers of his rougher companions, knelt in the long dormitory and said his prayers as his mother had taught him to do. He was a favorite pupil of the master of the school, and when Dr. Arnold died, Stanley, by common consent, prepared the *Life and Letters* of that famous man. At Oxford he carried off honors and, at graduation, he won a scholarship that gave him an independent income for a few years. He visited Greece with his own notion of travel. He never wanted to visit a place till he had read up its history and "when once I have seen a remarkable sight," said he, "I do not care to see it again. The second sight of Prague quite revolted me, and though I saw Marathon on a rainy day I refused three or four opportunities of seeing it again. On the first sight of scenes of this sort a whole new world opens before me; floods of thought come in, which are indelible, and there is nothing new in a second visit." Returning to England he became an Oxford tutor. As secretary of a university commission, he was influential in introducing reforms, among others one abolishing some of the theological tests that barred many young men from financial and scholastic favors.

In 1851 he was appointed canon of Canterbury, a most desirable position.

From Canterbury Stanley returned to Oxford as regius professor of ecclesiastical history. He introduced his course of lec-

tures with a characteristic quotation from Bunyan, a famous dissenter. In 1863 he was made dean of Westminster. He spent the last days of a busy life writing sermons, receiving visitors, and writing books, including the *Memorials of Westminster*. His duties as dean were particularly acceptable. Every foot of Westminster Abbey was holy ground to him. Stanley, it is safe to say, was one of the most widely beloved men England has produced. Intelligent and progressive, but not aggressive, Dean Stanley made for piety, liberality of view, and learning. His remains lie in the Abbey in the chapel of Henry VII.

See ARNOLD; WESTMINSTER ABBEY.

Stanley, Henry Morton (1841-1904), a noted explorer and newspaper correspondent. His original name was John Rowlands. He was born near Denbigh, Wales, and died in London. He was brought up in a poorhouse. In 1857 he came to New Orleans as a cabin boy. He was adopted by a wealthy merchant who gave him his name. At the beginning of the Civil War, he enlisted in the Confederate Army. He was taken prisoner and was discharged with the understanding, afterwards carried out, that he enter the United States Navy. In 1867-8 he became a special correspondent for the New York *Herald* on Lord Napier's Abyssinian expedition. He also represented the *Herald* in Spain during the Carlist uprising of 1868-69.

About this time, the civilized world became worried because Livingstone had not been heard from. The *Herald* commissioned Stanley to organize an expedition in search of the great African explorer. Stanley proceeded by way of the Suez Canal to Bombay, whence he set sail for the coast of Zanzibar. In January of 1871 he set out with a force of ninety-two men for the interior of Africa. He found Livingstone on Lake Tanganyika, November 10, 1871. Stanley remained with the explorer four months. Finding it impossible to prevail upon Livingstone to give up his plans, Stanley furnished him with supplies and returned to England. An account of the trip was published under the title of *How I Found Livingstone*.

In 1874 Stanley undertook, this time in the employ of the New York *Herald* and the London *Daily Telegraph*, a second expedition. He set out as before from Zanzibar. He explored what is known as the "Equatorial Lake Region," navigating Victoria Nyanza and Albert Nyanza. He traced the Congo River from its source to its mouth. He was the first white man to travel the length of the Congo. This expedition led to the publication in 1878 of *Through the Dark Continent*. He was instrumental in founding the Congo Independent State under the protection of the king of Belgium. He declined to become its first governor. He made a third and a fourth trip, publishing *In Darkest Africa* in 1890 and *Through Southern Africa* in 1898.

Stanley lectured in England, America, and Australia. He was granted the freedom of the city of London, and was knighted by Queen Victoria. In 1890 he married a young artist, through whose ambition he was elected to a seat in the British Parliament. His last years were spent in comfort and retirement. His funeral exercises were held in Westminster Abbey. Among those present were representatives of the royal family, ambassadors, ministers, and public officials. A grandson of Livingstone was one of the pallbearers. The funeral procession was led by Lady Stanley and a daughter of Livingstone. As the coffin was borne past the tomb of Livingstone, the company halted, and for a moment there was a pathetic pause. Everyone present was thinking of that lonely meeting between the two great explorers in a mud hut in far-off Africa. Stanley was buried in the little churchyard of Pirbright, in Surrey, a beautiful spot which he himself had selected. A huge granite stone twelve feet high, four feet wide, and two feet thick has been set up to mark his last resting place. It weighs six tons. The face of the rock bears the deep cut words

HENRY MORTON STANLEY

and beneath them is his African name

BULA NATARI,

meaning the Rock Breaker. His epitaph is the single word "Africa."

See LIVINGSTONE, DAVID; BELGIAN CONGO.

Stanton, Edwin M. (1814-1869), an American statesman. He was born at Steubenville, Ohio. He studied at Kenyon College. He was admitted to the bar in 1836. Twenty years later, after practicing in his native town and in Pittsburg, he opened an office in Washington, D. C. Lincoln made Stanton his secretary of war in 1862, a position which he held until forced out by a disagreement with President Johnson. President Grant appointed him a justice of the supreme court, but he did not live to discharge the duties of the office.

Stanton, Elizabeth Cady (1815-1892). A leading advocate of woman suffrage. Elizabeth Cady was the daughter of a New York lawyer, a member of Congress. She was born at Johnstown, and was educated in a local academy. She married Henry B. Stanton, a pronounced abolitionist. While in England attending an anti-slavery meeting, Mrs. Stanton became acquainted with Lucretia Mott. The first woman suffragist convention held in America was called to order by Mrs. Stanton at Seneca Falls, New York, in 1848. Mrs. Stanton and Susan B. Anthony were co-workers in reform movements. Mrs. Stanton's acknowledged social grace and pleasing qualities as a speaker and presiding officer gave her a large place in women's organizations. See ANTHONY.

Stanton, Frank Lebby (1857-), an American journalist and poet, was born at Charleston, S. C. Entering upon a journalistic career at a very early age, Mr. Stanton soon became connected with the press of Atlanta, Ga. He won popularity as a conductor of columns of wit and humor. His column, "News from Billville," in the Atlanta *Constitution* is especially well known. With the latter paper he has been associated for many years. He is the author of several volumes of poems that have become very popular. Among these, the most important are, *Songs of the Soil, Up From Georgia, Little Folks Down South* and *Songs From Dixie.*

Star, a heavenly body shining with its own light. This definition excludes the planets and their satellites, but includes the sun, which is supposed to differ from other stars mainly in our being near it. It is worth while to know that the stars twinkle but the planets do not. Many of the stars are larger and much hotter than the sun; some are smaller and cooler. Six or seven thousand stars are visible to the average eye. About 2,500 are visible at any one time. No one can see all the stars without observing in both hemispheres. About 100,000 stars may be seen with a common opera glass. Three times that number are visible through a small telescope. A telescope forty inches in diameter reveals possibly 100,000,000 stars. Stars not visible to the eye through the most powerful telescope may be photographed by the delicate instruments now in use by astronomers. It is impossible to say whether the stars thus noted are practically all there are in the universe, or whether we have only made a beginning in seeing them.

The entire space of the heavens is charted in sixty-seven areas called constellations. This custom has descended to modern astronomers from the ancients, who were wont to decorate their charts with the figures of various animals and goddesses whose names were given to the constellations. The groups are thoroughly artificial, but are very useful in locating a star. Some of the brightest stars have individual names, but the great majority are designated by the name of the constellation and a Greek letter. Even this system fails in the case of telescopic stars, because the number of letters is not sufficient to name all the stars within one constellation. Astronomers have therefore resorted to numbers, each star being given its own catalogue number. The largest number in any one catalogue thus published is about one-third of a million. Of late charts have been formed by telescopic photography; that is to say, by a combination of the telescope and photographic camera.

Harvard observatory employs fifty assistants and has accumulated many thousand photographs taken at Cambridge for the northern hemisphere and in Peru for the southern. An ingenious mechanical arrangement enables an observer to put his camera under control of clockwork so that the camera follows a particular spot in the heavens at exactly the same speed with which the earth would turn it away from that spot. If a luminous body in the area

under observation moves, it creates a trail or path on the photographic lens, calling attention to its movement instantly. A series of such photographs furnishes a complete history of the movements of heavenly bodies. Stars are classified according to their brightness. The ancients recognized six magnitudes. The first magnitude includes about twenty of the brightest. It is estimated that all together the stars give about one-sixtieth as much light on a clear night as a full moon. Some heat is doubtless received from them, but the amount is so slight that it has been impossible thus far to detect it. As distinguished from the planets, the true stars are sometimes called fixed stars, but it is certain that many and perhaps all are in motion like our sun. See ARCTURUS; ORION; PLEIADES; MILKY WAY; TELESCOPE; OBSERVATORY.

Starch, a fine, white, granular powder found in nearly all plants. It is composed of carbon, hydrogen, and oxygen, having very nearly the composition of sugar, into which, in fact, starch is readily converted. Starch is to the vegetable kingdom what milk is to the animal kingdom. It is the natural food of young plants. Many plants store up immense quantities of it in root-stocks, seeds, and fruit, in order that it may be drawn upon for next season's growth. Beans contain over ninety-five per cent of starch; oats from thirty to forty; Indian corn about sixty-five; and dried potatoes about twenty per cent. Wheat flour is rather more than half starch.

The process of preparing starch is very simple. A pared potato may be grated up fine and stirred well in water. If the milky liquid thus obtained be drained off and allowed to settle, a deposit of starch will be found at the bottom. By pouring off the water and drying the deposit in an oven, a small quantity of commercial starch may be obtained. This is the method employed in the large starch factories.

Tapioca and sago, used for puddings and soups, are starches obtained from the roots of the cassava and the stem of the sago palm respectively. The corn starch of the table is obtained by crushing and washing corn. The best starch for laundry purposes is made from rice. It is interesting in this connection to learn that in the sixteenth and seventeenth centuries, cuffs and ruffs were not infrequently starched yellow, and that at one time the Puritans preferred to starch their linen blue.

It is of interest to know that during the growing season every green leaf is a starch factory. The materials required are carbon and water. The water is absorbed usually by the roots of the plant and ascends by way of ducts. The carbon is obtained from the air in the form of carbon dioxide, a combination of one atom of carbon with two of oxygen. All natural air contains more or less of this starch-forming material. The air enters the leaf through small doorways, usually in the under surface, that open in growing weather. The union of carbon and water is brought about by the green coloring matter in the leaf cells, and light. The starch is stored chiefly in the seeds and tubers as described above. Starch growing robs the soil of no fertility. The farmer who sells starch or starchy foods is not impoverishing his fields.

The granules of starch formed by different plants differ in appearance. Under a microscope a granule of wheat starch appears circular. Those of corn starch are smaller and appear somewhat six-sided. Those of the parsnip are exceedingly minute. Starch granules are wrapped in stout cellulose walls or cells containing from two to two hundred starch molecules. When heated these cells, as in the case of tapioca, burst open like popcorn.

See IODINE; SUGAR; BREWING; MALT; SEED; TAPIOCA; SAGO.

Star Chamber, in English history, a court of no little importance. Its sessions were held originally in a hall council chamber in the palace of Westminster, the ceiling of which was decorated with gilt stars. The court of the Star Chamber was authorized by Parliament during the reign of Henry VII. It became powerful under Henry VIII and Elizabeth. It was composed of members of the king's privy council. Its proceedings were exempt from the ordinary rules of courts of law. Originally it was a special tribunal called by the English sovereign to consider crimes and criminals beyond the reach of ordinary modes of court procedure. In case a nobleman were too powerful to be tried in open

court, his offense was considered and his punishment decided upon in the Star Chamber. The court had no jury, and it did not have authority to pass sentence of death, but pardons were issued and heavy fines imposed. Property was confiscated. Instances are not wanting in which offenders were sentenced to loss of their ears, or were set in the pillory. The Star Chamber was never popular with the English people. It was considered an infringement of the right of trial by a jury composed of one's peers. It was abolished by an act of the Long Parliament in 1641 in the reign of Charles I.

Starfish, a marine animal usually regarded as the type of radiate animals. The common starfish of the Atlantic coast is found from Labrador southward, being especially numerous on oyster beds. An apple-shaped body or disk in the center has a single opening or mouth on its lower surface, and is surrounded by five pointed rays. A corresponding animal on the British coast is called "five-fingered-Jack." Disk and rays are covered with a skeleton of many loosely connected rough pieces of limy shell. The starfish has neither jaws nor teeth. It is thought that a sensitive spot near the end of each ray is an eye, and that a blunt tentacle close by it is an organ of smell. The starfish travels mouth downward by a system of tiny feet or suckers along the under side of each ray. These feet are the ends of tubes connected with a central water reservoir under muscular control. If the animal desires to move eastward, the feet along the eastward arm are filled with water and protruded to their utmost length. They adhere to the surface by suction or atmospheric pressure. By exhausting the water along this arm, they may be shortened. They are not able to let go, and so drag the whole animal eastward. In this way a starfish can ascend a vertical wall or move about on the under side of a board. In feeding, the starfish arches its body over an oyster, turns its stomach inside out through its mouth, absorbs the juices of the oyster, draws its stomach inside again and is fed. Starfishes are a pest to an oyster bed, and are a source of trouble to fishermen. There are many other curious facts about the starfish, which, of course, is not a fish at all. Sometimes the arms are so short that they are mere angles of a pentagon. In some species each arm becomes four. Ordinary starfish are the size of one's hand. One Pacific starfish is two feet in diameter. See ANIMAL; SEA-URCHIN.

Stark, John (1728-1822), a distinguished American officer in the Revolution. He fought in the French and Indian War, and in 1775 joined the Continental Army. As colonel he participated in the battles of Bunker Hill, Trenton, and Princeton. He resigned his commission in 1777, only to resume his activities within a few months, and resist the approach of British troops from Canada. After the battle of Bennington he was made brigadier-general, and he distinguished himself afterwards by successfully cutting off Burgoyne's retreat from Saratoga. His services continued until the close of the war when he retired to quiet farm life. When he died in 1822 only one Revolutionary general survived him.

Starling, a handsome singing, perching bird of Europe, about eight and one-half inches in length. The plumage of the common starling is of lustrous black. Some parts are iridescent with dark green, others with a steel blue, purple, or violet sheen. The bill is yellow; the feet are red. The American red-winged blackbird is frequently, though incorrectly, called a starling. Starlings gather in flocks and live a life much like that of the blackbird. A few pairs of starlings were introduced by the fruitgrowers of Victoria, Australia, in the hope that they might prove helpful in destroying insects. They have multiplied until myriads hover over the orchard and pounce down on the ripening fruit. Like the English rabbit in Australia and the English sparrow in America they have become a serious pest. See BLACKBIRD.

Star Spangled Banner. See KEY, FRANCIS SCOTT.

Staten Island, an island that is situated about five miles from the southern end of Manhattan Island and forms a part of Greater New York. The island is roughly triangular and has an area of 70 square miles; the maximum length is 13.5 miles; the maximum width, 8 miles. It is con-

nected by ferries with Manhattan and with Perth Amboy, N. J. The strongest defenses of New York harbor are on Staten Island. The population of the island is estimated at about 100,000.

State, Department of, an executive department of the United States government which has charge of the relations between the United States and foreign nations and of communications between the states of the Union and the Federal government. It is the oldest department in the government, having been organized as the Department of Foreign Affairs by the Continental Congress in 1789.

The head of the department is the Secretary of State, who, next to the President, is the most important official in the government. He is appointed by the President and is at the head of the cabinet. He is also first in the order of presidential succession in case of death or disability of both the President and Vice-President. He has charge of the negotiation of all treaties and of all correspondence with foreign nations. It is his duty to receive all foreign ministers and ambassadors and present them to the President. He also prepares the credentials for all American diplomatic representatives abroad and issues passports to American citizens who desire to travel in foreign countries, and through him is issued all correspondence with public ministers and consuls from the United States.

The Secretary of State is the keeper or custodian of the Great Seal of the United States, which must be affixed to all proclamations, warrants and appointments of the President. He is likewise custodian of all treaties, public documents, laws and official correspondence with foreign nations.

The Secretary is aided by an under secretary and three assistant secretaries, a counselor who is an authority on international law, and a solicitor, who is a legal adviser. The work of the department is divided among a number of divisions and bureaus such as the divisions of Far Eastern Affairs, Near Eastern Affairs and Latin American Affairs; bureaus of accounts, of appointments, the consular bureau, the diplomatic bureau and the bureau of indices and archives. The work of the entire department requires the services of about 150 clerks besides the officials.

States. See UNITED STATES.

States-General. See FRENCH REVOLUTION.

States' Rights, in American history, a term employed to designate such rights or authority as may have been retained by the states and not delegated by the Constitution to the general government. See CALHOUN; HARTFORD CONVENTION; NULLIFICATION.

Statics. See DYNAMICS.

Stationery. See PAPER.

Statuary Hall, in the national capitol at Washington, the room occupied by the House of Representatives prior to 1857, when it was moved to the present chamber. The floor of this room was originally four feet lower than it is today and it is said that this elevation compared to that of the Senate gave rise to the misleading designation of our more representative body in Congress as the "lower house." Many notable events have taken place here, among which may be mentioned the inauguration of Madison, Monroe, and Fillmore, the balloting by states in 1825, as a result of which John Quincy Adams was selected president over Andrew Jackson, and the paralytic stroke, under dramatic circumstances, suffered by Adams, then a member of the House, in 1847, from which he died in the speaker's room two days later. In 1864 this room was set apart as a National Hall of Statuary, and the president was authorized to invite each state to contribute two statues in bronze or marble of deceased citizens of the state, "for their historic renown or for civic or military service." Not over one-third of the states have thus far availed themselves of this privilege, several having made but one selection. About thirty statues are already placed. In the main they represent men of national reputation though several have a mere local celebrity.

Staubbach, a celebrated waterfall of Switzerland. The name signifies dust brook. It is situated in the immediate vicinity of Lauterbrunnen, eight miles south of Interlaken. Some twenty rivulets from the melting snows and mists on the shoul-

der of the Jungfrau fall from the rocky heights here. The best known of these is the Staubbach. It falls from a projecting rock 980 feet in height, six times the height of Niagara, compared to which, it is, of course a mere cupful. It falls so far that the greater part of the water is converted into mist before it reaches the ground and is wafted by the winds over the meadows far and near. Seen in the morning sunlight it has the appearance of a transparent silvery veil swung to and fro by the wind. Not infrequently it is tinted with all the hues of the rainbow. At times the volume of water is somewhat disappointing.

Stead, William Thomas (1849-1912), an eminent English journalist, was born at Embleton, Northumbria. After a brief period of schooling, he entered into business. In 1871 he was appointed editor of a small paper in Darlington, *The Northern Echo.* Mr. Stead conducted this paper with such success that in 1880 he was made assistant editor of the *Pall Mall Gazette,* of which he became editor-in-chief in 1883. In this position he introduced into England such American journalistic methods as the interview, illustrations and "extras." He also became a vigorous combatant of social evils, an advocate of international peace, and one of the principal apologists for Russia. His paper was the first in England to attempt control of details of public policy, and that he was successful is shown by his forcing the Gladstone government to send Gordon to Khartum.

Mr. Stead founded the *English Review of Reviews* in 1890, the *American Review of Reviews* in 1891, and the *Australian Review of Reviews* in 1894. In 1893 he published *If Christ Came to Chicago,* containing a striking account of the criminal tendencies in Chicago, and thereby creating a great discussion on two continents. A previous work entitled, *The Maiden Tribute of Modern Babylon,* caused his imprisonment for three months, but also led directly to the enactment of the Criminal Law Amendment Bill. Mr. Stead became a convert to spiritualism. He conducted a journal called *The Borderland,* which recorded spiritualistic experiences. In 1911 he announced his intention of establishing in New York a spiritualistic station, where messages to and from the departed could be sent and received. He was killed in the *Titantic* disaster while on his way to the United States. Among his works are *The United States of Europe, The Truth About Russia, Labor War in the United States* and *Satan's Invisible World.*

After the death of Stead, his daughter, Estelle Stead, carried on the *Review of Reviews.* She also wrote a biography of her father, more especially with reference to his experiences in spiritualism, and his proposed work in New York.

Steam, stēm, a vapor of water. Under ordinary atmospheric conditions water is changed into steam at a temperature of 100° C or 212° F. If water be heated so as to generate steam in a closed receptacle, as in a boiler, the steam struggles with the strength of a giant to escape. The more steam generated, the greater the bursting force. Advantage has been taken of this fact to apply steam pressure to the movable pistons of engines in order to perform work. Making allowance for loss by cold and friction, it is estimated that the work done by from five to twenty-five pounds of steam passing through an engine in an hour is equal to that of a horse. Where water and cheap fuel are at hand, steam power is considered more trustworthy and not much more expensive than falling water. The statisticians of the United States census estimate that at present the amount of steam used in manufactories is doing an amount of work that would require the employment of approximately 9,000,000 horses. Hydro-electric power, however, is supplanting steam in many factories because it is less expensive to install and to operate. See Steam Engine

Steamboat, a boat propelled by steam. The notion of driving a boat by paddles is not new. The ancient Egyptians and Romans propelled their war galleys oftimes by wheels operated by means of a windlass turned by men, and later the Romans are said to have taken oxen aboard their boats to operate the capstans. Following the invention of the steam engine numerous efforts were made in Spain, France, England, and Scotland to apply

steam power to paddle-wheels. A number of crude steamboats were operated for a time on the rivers of Europe and then abandoned. The first successful steam vessel in Great Britain was built at Glasgow in 1812. It had a hull sixty feet in length, and attained a speed of five miles an hour. In the meantime John Fitch of Connecticut applied steam to the paddles of a boat. He made his trial trip on August 22, 1787, and attained a speed of three miles an hour. Fitch constructed several boats with rather unsatisfactory results. He was a watchmaker by trade and died in poverty at Bardstown, Kentucky, in 1798. A number of American inventors struggled with the problem, but the credit is due to Robert Fulton for the construction of the first successful American steamboat. This he named the Clermont. It was a side-wheeler of considerable size, being 140 feet in length, 16 feet wide, and 7 feet deep. The trial trip from New York to Albany was begun August 17, 1807. Regular lines of steamboats soon appeared on the Hudson, on Long Island Sound, the Delaware, and in the coast service. A steamboat ran from Boston to Maine for the first time in 1823. The first steamboat to appear on the waters of the Mississippi was the New Orleans, built at Pittsburg, Pennsylvania, in 1811. Although superseded in part by railroads, fine lines of passenger steamboats, as well as freighting steel vessels, are found on the large rivers, lakes, and sounds of both continents.

The steamboat preceded roads and railways. It transported live stock, implements, and supplies. A special type of long, broad, flat-bottomed, light-draft boats, modeled on the barge, was developed on the Mississippi River without which the settlement and early development of the interior would have been impossible. The Mississippi and its branches were traversed by regular lines of boats with large capacity. Wherever the water was too shallow for a large boat, smaller boats were set up and these landed the machinery for still smaller boats, and so on, until the entire Mississippi system from the Rocky Mountains to the Alleghanies was covered by steamboat service. Where the steamer left off, the stage coach began. Stirring tales are told of reckless steamboat racing between rival lines. A famous race of 1,218 miles between the Natchez and the Robert E. Lee was run June 30th-July 4th in 1870, from New Orleans to St. Louis. It was won by the latter boat in three days, eighteen hours, and thirty minutes. Mark Twain's *Old Times on the Mississippi* gives an idea of life among the river boatmen.

See STEAMSHIP.

Steam Engine, a machine driven by steam. It consists essentially of a boiler for generating steam; a cylinder, containing a piston; a piston rod; and a power wheel to be driven by the latter. By means of sliding valves, steam is admitted to the cylinder, first on one side of the piston, then on the other. The expansive force of the steam drives the piston to and fro. Any gas would answer the purpose, but steam produced from water is the cheapest and most efficient gas that can be employed. It is estimated that, under favorable circumstances, a pound of coal per hour can do as much work as a horse. Only about one-eighth of the heat value of fuel can be converted into actual work. The rest is lost by friction and waste.

The invention of the steam engine is credited popularly to James Watt. He invented improvements, but not the steam engine. Hero, a Greek scholar of Alexandria, left a manuscript, published about 120 B. C., in which he describes certain steam toys. The scientists, if we may term them such, of the Middle Ages, amused themselves with steam. A treatise by Da Porta in 1601 describes a steam fountain. A few years later a steam turbine was invented. Steam jets were employed during the seventeenth century to improve the draft of chimneys. A steam contrivance was invented capable of turning a spit on which meat was roasted.

The first practical engine appears to have been invented about 1650 by Edward Somerset, Marquis of Worcester. He used his "steam fountain" to pump water from the moat to the tower of Raglan Castle. His device was improved by engineers Savery and Smeaton. Further improvements were made by Newcomen, who took out a patent in 1705; and before long steam was used generally in pumping water from the mines

of Europe. All the early inventions depended in part on atmospheric pressure. The piston was driven in one direction by steam, and was driven backward by atmospheric pressure. Steam was introduced into one end of the cylinder only. After it had driven the piston, it was condensed by a jet of cold water, thus forming a vacuum. Atmospheric pressure drove the piston back again. The sliding valve used to admit and cut off steam was formerly worked by hand. It is said that a boy named Humphrey Potter, in 1718, devised the scheme of attaching it to the piston rod so as to save himself the trouble of shoving it to and fro by hand.

About 1764 James Watt, a young instrument maker, began a series of improvements resulting in the steam engine practically as it is known today. He introduced steam first on one side of the piston, then on the other. He took out his first patent in 1769. The Watt engine may be said to have been perfected in 1782. This is the date assigned usually to the invention of the steam engine.

The amount of steam used for power purposes is now almost beyond computation. Fuel, steam, and engines are doing several times as much work as it would be possible for the entire human race to perform. Steam is doing work better and more cheaply than slaves could do it. It costs less to use steam than to feed men, to say nothing of their wages. In other words, the steam engine has made slavery unprofitable and drudgery unnecessary. In the manufactures of the United States alone (1920) steam is doing the work of 10,000,000 horses. If we take into consideration the use of steam for heating and for transportation as well, it may be seen readily that the steam engine is one of the great factors in modern civilization.

A new type of engine known as the steam turbine is now claiming attention. It is a revival of the steam toy of Hero of Alexandria. Instead of admitting steam first on one side and then on the other of the piston, resulting in a to-and-fro movement of the piston rod, steam is admitted to a turbine through a nozzle. It plays continuously on curved flanges, giving the shaft of the turbine a continuous twirling motion. The steam turbine is a modification of a water turbine long in use in mills. This new engine has stood preliminary tests so satisfactorily that it has been adopted already for use in ocean liners and battleships. The turbine requires very much less machinery and metal than the old style engine. There is a saving in the cost of building a turbine. It weighs less; it occupies less space. The saving in weight and bulk enables the shipowner to carry that much larger cargo. There is also economy in the use of steam. The ordinary steam engine uses from twenty-five to thirty pounds of steam per horse-power per hour. The best Corliss engine requires twelve and one-half pounds of steam, while the steam turbine, it is claimed, requires from six and one-half to ten pounds. The turbine gives increased speed. It is less liable to explosion. It requires less by way of repair. There is also another very decided advantage: the jar connected with the to-and-fro motion of the piston rod is obviated entirely. It is worthy of note, also, that experiments are on foot designed to replace, if possible, the bulky, dirty cargo of coal required for fuel by a composition of gun-cotton and nitroglycerin. It is proposed to burn large candles of these explosives in steam cylinders.

See WATT; STEPHENSON; LOCOMOTIVE; STEAM.

Steamship, a ship propelled by steam. If nothing be said to the contrary, the term is understood to mean an ocean liner or ocean "grayhound." For some account of the development of the steamboat, the reader is referred to the article under that head.

A modern steamship of the first class is a stupendous affair. A particular account of one of the large steamships may serve for a general description of them all. Very little wood enters into its construction. The skeleton is a framework of steel girders, one-seventh of a mile in length and seven stories high. This frame is covered with large steel plates from an inch to an inch and three-eighths in thickness. Placed on edge, end to end, they would make a steel wall five feet high and eight miles long. Once afloat this steel palace is moved by two mammoth engines with a strength equivalent to that of 30,000 horses. There

are fifteen boilers, heated by ninety-six furnaces. Two hundred and fifty tons of coal are a ship's daily allowance. The ship's smokestacks rise straight up to a distance of 128 feet, like the giant trees of California. If laid on the side ten horsemen could ride through them abreast.

Enormous polished pistons of solid steel one foot and a half in diameter driven by a steam pressure of 192 pounds to the square inch convey the power of the engines to the crank shafts. These shafts lie side by side and run to the heel of the ship where they terminate in outside screw propellers. These propeller shafts are hollow tubes of steel made in sections. They are 225 feet long and require three-fourths of a million pounds of steel in their construction. Each propeller or screw has three blades. They are made from an alloy of manganese and copper, the toughest metal known. Each blade weighs ten tons and costs $6,000, the manganese bronze being worth $600 a ton. Pistons, shafts, and propellers move noiselessly or with a low rhythmic movement seemingly at a very low speed. The piston stroke is six feet; the crank shaft turns seventy times per minute, or a little oftener than once per second. Although the ship with its cargo weighs over 35,000 tons and sinks thirty-two feet in the water, it is driven forward thirty feet by each revolution and is propelled across the Atlantic from New York to Liverpool in less than five days.

Far up a narrow stairway forty feet above the surface of the water and protected by a warning, "Passengers not allowed," is the captain's room. The machinery of the ship is controlled from this point by automatic devices. Dials indicate the condition of affairs. A touch of a lever here, and the ship turns to the right; on moving another lever, it turns to the left; turn the indicator forward and the ship increases its speeed; turn it backward and the ship slows down. In three seconds' time the officer on watch can reverse the direction of the engines and bring the ship to a standstill in about two and one-half lengths, that is to say, about one-third of a mile. By touching a lever in case of a collision, doors can be closed automatically, dividing the body of the ship into eighteen separate water-tight compartments. Twenty seconds are sufficient to close these doors and five of these precious seconds are spent in ringing bells to warn persons to get out of doorways. Signals may be given which man the fire hose and lower the lifeboats.

The devices for controlling a steamship are remarkable. The rudder, weighing fifty-three tons, is controlled by a pair of engines, only one of which is in actual use. The other stands under full steam. In case one engine fails, its mate can be thrown into instant operation by a single movement of a lever. If both engines break down, the rudder can be connected with a capstan, operated also by an engine. If the rudder should break, the steamer is provided with enormous drags which may be thrown out to retard the ship's motion on either side, just as an oar or a hand thrust into the water on either side of a skiff will cause it to turn in that direction.

There are over 100 independent engines in such a ship. They work capstans, cargo hoists, steam winches, and elevators. The need of powerful auxiliary engines may be known from the fact that the links of the anchor chains weigh 200 pounds each. An electric plant, larger than is needed in a city of 3,000 inhabitants, lights the ship, turns fans, hoists ashes, lifts provisions, warms the staterooms, heats water, ventilates the barber shop, and turns the kitchen spits on which fresh meat is roasted. The chief engineer must see that feed pumps, circulating pumps, ballast pumps, fresh water pumps, brine pumps, evaporating pumps, filtering pumps, and a dozen others are kept in order. Some idea of the amount of machinery in a modern steamship may be had from the fact that fifty gallons of lubricating oil are required daily.

With all the labor-saving appliances, both steam and electrical, which the ingenuity of man has been able to devise, the services of 1,000 men are still needed. The engineer has 200 men under his direction. Three shifts of twenty-five men each bring coal to the furnaces; thirty men are required to shovel it in. Thirty-five "greasers" oil the machinery. The ship's purser and the chief steward look after the housekeeping of the ship. They employ 100 dining room stewards, half as many bedroom

stewards, nine stewardesses to look after the needs of women passengers, cooks, scullions, errand boys, storekeepers, linen keepers, and bootblacks, an army of 200 or 300 in all.

When the 1,500 passengers go aboard an ocean liner in New York harbor, they hardly realize that the steward has already taken on 31,000 pounds of fresh beef, mutton, and lamb, 2,000 chickens and ducks, 1,000 head of game according to the season, 800 bushels of potatoes, 150 barrels of flour, 6,000 pounds of ham and bacon, 10,000 eggs, 64 sacks of sugar, with fresh fruits and other vegetables in quantities to correspond. Not less than 3,000 quarts of milk and cream, 5,000 pounds of butter, and 3,000 pounds of ice cream are put in cold storage, and all for a week's voyage. Some standard articles, such as salted meats and flour, are kept aboard in quantity; but ordinarily the steward expects to balance his accounts and lay in a fresh supply at the end of each trip.

The largest steamship in transatlantic service is the *Leviathan,* formerly the German *Vaterland,* built before the World War and taken over from Germany by the United States. During the war this mammoth vessel was employed as a transport for carrying American troops to France, and on one voyage carried 17,000 men. After the return of American troops from Europe, the *Leviathan* was reconditioned under the direction of the United States Shipping Board, and late in June, 1923, on a trial trip broke all records for speed, including speed per hour and continuous speed for 24 hours. On July 4, 1923, she was placed in regular service between New York and English ports, with a capacity for 5,000 passengers, and ranking as the finest ship afloat, with accommodations not excelled by the most luxurious hotels. Her replacement value was then given as $25,000,000. She is 909 feet long, has a 98 foot beam, and has a displacement of 58,000 tons.

Steam navigation in the United States began practically with the successful trips on the Hudson River of Robert Fulton's *Clermont* in August, 1807, after which she began to run regularly between New York and Albany. The first steam vessel to cross the Atlantic was the *Savannah,* of 350 tons and 100 feet in length, which made the passage from Savannah, Ga., to Liverpool in 1819 in 25 days, using both sail and steam power. This was followed by transatlantic voyages by the Dutch steamer *Curacoa* in 1828 and a Canadian-built vessel, the *Royal William,* in 1832; but the real beginning of steam navigation of the Atlantic occurred in 1838, when the *Sirius* and *Great Western* started from English ports for New York within four days of each other, arriving April 22 and 23 respectively. The *Great Western* averaged 208 miles per day, and her highest run was 247 miles. In 1839 the Cunard Line was founded by Samuel Cunard, of Halifax, Nova Scotia, and for some years this company, assisted by a government subsidy, enjoyed a practical monopoly of the transatlantic service. Several American lines were started in 1850, of which the Inman Line was the most successful. The first Cunard steamships were of wood, with paddlewheels, but the Inman Line began operation with screw-propelled vessels of iron. These proved cheaper to operate and the screw-propeller soon began to replace the paddlewheel. Between 1840 and 1855 the size of ocean steamships increased rapidly, culminating in the building of the *Great Eastern,* which was considerably ahead of her times but was utilized in laying the first transatlantic telegraph cable.

Demand for increased speed and reduction in weight of marine engines led to the design of triple-expansion engines, which appeared in transatlantic service about 1874, and became common by 1880. Water-tube boilers led to further progress in marine engineering, and the quadruple-expansion engine followed. This has now been largely replaced by steam-turbine engines, with which the largest and most powerful transatlantic steamships are now equipped. Just prior to the great war, the demand for speed between Europe and America brought out the great steamers *Lusitania* and *Mauretania,* of the Cunard Line, which reduced the average passage across the Atlantic to less than five days.

Among the merchant fleets of the world, which largely consist of steamships, that of the United States now ranks second.

As of June 30, 1922, the total tonnage of the principal maritime countries was as follows: Great Britain, 19,053,000 tons; United States, 12,506,000 tons; Japan, 3,325,000 tons; France, 3,303,000 tons; Germany, 1,783,000 tons; total for the world, 56,802,000 tons. As of September 1, 1922, fifty-four steamship companies, of which twenty-seven were in New York, were the managers or operators of United States Shipping Board vessels, serving trade routes from American ports to the principal ports in Europe, South America, British India, Australia and New Zealand, the West Indies, the Orient, the Dutch East Indies, and the east and west coasts of Africa.

The foreign commerce carried on by the United States Shipping Board vessels for the fiscal year ended June 30, 1922, was as follows: Exports, 6,634,381 tons of cargo; imports, 4,313,913 tons of cargo.

Steam Turbine. See STEAM ENGINE.

Stearin, in chemistry, a compound of stearic acid and glycerin. Stearin is the chief component of suet, tallow, in short of the harder fats. When freed from fat and crystallized, stearin takes the form of white, pearly scales, soft to the touch but not greasy. Pure stearin is tasteless and odorless. It is insoluble in water but is soluble in alcohol and ether. It is used in the manufacture of certain chewing gums. Stearin may be separated into stearic acid and glycerin. Stearic acid, more or less pure, is the material of wax candles. An impure stearin may be obtained from lard by pressing out the oil. To properly comprehend the subject, the reader should disabuse his mind of any notion that an acid is necessarily a liquid.

Steatite. See TALC.

Stedman, Edmund Clarence (1833-1908), an American poet and critic. He studied at Yale University and began early to contribute to New York periodicals. In 1869 he went into business in New York, and was for many years a member of the stock exchange. He published several volumes of verse. Among them may be mentioned *Poems, Lyric and Idyllic, Alice of Monmouth, An Idyll of the Great War, The Blameless Prince, Hawthorne and Other Poems, Lyrics and Idylls,* and *Poems Now First Collected.* Mr. Stedman's critical works are *The Victorian Poets, The Poets of America, The Nature and Elements of Poetry,* these being followed by *A Victorian Anthology, An American Anthology* and *Genius and Other Essays.* He also edited, with Ellen M. Hutchinson, *A Library of American Literature,* in 11 volumes, and, with George E. Woodberry, the *Works of Edgar Allen Poe.* After the death of Lowell, Stedman was without doubt the leading American poet and critic.

Steedman, Charles (1811-1890), an American naval officer, was born at Charleston, S. C. He entered the navy in 1828, serving in the Mexican War at Vera Cruz and Tampico. After being employed in the United States Naval Observatory at Washington, he was made a commander, and in 1859 was in charge of the *Dolphin* in the Paraguay expedition. During the Civil War he took part in many battles, and in 1862 captured Confederate batteries at the mouth of the St. John's River, Fla. In 1865 he commanded the Mediterranean squadron, and in 1866 was made a commodore. He was commander of the Boston Navy Yard for several years, and was made rear-admiral in 1871. He retired in 1873.

Steel, an alloy of iron and carbon. It is midway in structure between cast iron and wrought iron. It contains less carbon than cast iron and more carbon than wrought iron. Examined under a microscope, steel is found to be composed of many particles of extremely soft, ductile iron, and a comparatively few particles of a hard, brittle compound of iron and carbon.

There are various kinds of steel. The percentage of carbon varies from a half of one per cent to two per cent. The steel used for the armorplating of battleships contains about three per cent of nickel. Manganese steel contains about twelve per cent of manganese and one and one-half per cent of carbon. It is ductile but it is too hard to be cut by tools. It is used in the construction of burglar-proof safes. Chrome steel, used for the same purpose and for the armor of projectiles, also in the construction of stamp mills, contains about two per cent of chromium.

The greater part of what is known as iron work now consists of steel. Four-fifths of the world's steel is manufactured in the United States, Germany, and Great Britain. Next in order come Russia, France, and Austria-Hungary. The total annual production is not far from 40,000,000 tons. This enormous product is used in the manufacture of fine cutlery, tools, implements, barbed wire, wire nails, bolts, rivets, chains, pipe, sheathing, vehicles, cars, rails, locomotives, steamers, machinery, armorplate, girders, beams, pillars, bridges, firearms, and cannon. Steel is replacing wood very rapidly in the construction of machinery and as a building material.

Ordinary iron ore contains more carbon than is required for steel. In making steel it is necessary, first of all, to purify the iron by burning out the carbon. After that the elements for the alloy are introduced. The chief methods of getting rid of the carbon are known as the Bessemer process and the Siemens or open-hearth process. In the Bessemer process a powerful current of air is forced through holes in the sides of a graphite crucible containing from three to fifteen tons of molten iron. A tremendous bubbling and a shower of sparks characterize this process. When the carbon in the iron has been burned out in this way a process occupying twenty-five to forty minutes, the converter contains pure iron. A small amount of fresh ore, containing the right quantity by weight of the various elements needed for the alloy is then added, and the contents of the converter are run into a mold to form billets of steel. In the open-hearth process the iron is melted in shallow, dish-shaped graphite crucibles. A powerful blast of air passes to and fro over the surface, burning out the carbon.

About three-fourths of the steel produced in the United States is by the open-hearth process, which is less expensive than the Bessemer process because larger quantities can be made at one time. Blister steel is produced by sealing up carbon and bars of wrought iron hermetically and heating them for days in a furnace. Blister steel hammered at a welding heat produces the best of all steel. It is known as shear steel. It is used for fine cutlery.

The leading steel company, in fact, the richest manufacturing concern in the world, is the United States Steel Corporation, with headquarters at Pittsburgh, Pennsylvania. It controls 125 lake vessels, several railroads, 18,000 coke furnaces, 78,000 blast furnaces for pig iron, and about 150 steel works, with an annual capacity of 9,000,000 tons of steel. The company employs nearly 200,000 men and pays anywhere from $100,000,000 to $140,000,000 a year in wages. The annual dividends to stockholders are from $10,000,000 to $20,000,000.

See BESSEMER; CARNEGIE; KRUPP; NEEDLE; RAZOR; ARMOR; NAIL; RAILROAD; BRIDGE; IRON.

Steele, Richard (1672-1729), an English essayist. Of English parentage, he was born at Dublin. He was a schoolmate, a fag, and, later, a literary partner of Addison. He was a sort of scapegrace. He left Oxford to enlist as a private in the Horse Guards, and was cast overboard by his angry father, but drifted to London. He was a popular, rollicking, drinking, gambling young fellow. He rose to the rank of captain. He wrote articles on political affairs and attracted the attention of the government. He was appointed to edit the *Gazette,* an official announcement of government appointments, promotions, and important missions. To be gazetted for bravery was the ambition of every British officer. Steele also sat in Parliament and, had he not been a spendthrift, might have been a man of substance. As it was he lay in prison for debt part of the time and spent a considerable part of the rest in carousing and in reforming.

Steele had no success in reforming himself, but he was a goodhearted man and was thoroughly familiar with the follies of the world. He conceived an excellent plan for reforming society. Acting on a thought suggested by his former connection with the government publication, he decided to establish a social gazette which should appear regularly and be written in a bright, pungent style calculated to interest society people of the town and country. He had already written a few comedies designed to amuse people, and at the same time correct fashionable follies. He now enlisted Addison in the establishment of *The Tattler.*

The two friends filled a small sheet three times a week with foreign news and with remarks on the social manners of the day. We here see the beginning of the foreign dispatches and editorials of the modern newspaper. No doubt the two friends had sport in planning what to say and in watching the effect on fashionable people. They met with companions at a London coffee-house and had their share of fun in hearing how my lady and my lord squirmed. *The Tattler* appeared in 1709 and reached 271 issues. *The Spectator,* a sheet of similar purpose, was begun as a daily in 1711, and, though suspended for a time, reached 635 issues. A third paper, *The Guardian,* appeared 175 times. Addison furnished rather more than a third—really the best third—of the articles, but Steele deserves credit for beginning and managing the enterprise. His contributions to the pages of the three papers would be celebrated were they not outclassed by those of Addison. In later years, Steele grew angry with the Whigs because he was not remembered more generously in appointments to office. When Addison was in office, Steele felt that his old friend did not help him properly, and they drifted into opposing parties. Macaulay lays the blame on Steele. This estrangement, together with ill-health, embittered his latter years.

See ADDISON; SPECTATOR.

Steelyard, a place in London in which at an early date the merchants of the Hanseatic League maintained immense warehouses for the sale of their goods. The topic is of interest chiefly for the caution it lends not to be hasty in concluding that words are related because they are spelled alike. The first syllable of the name is a corruption of staël, meaning a leather tag or seal affixed to a bolt of cloth as a certificate of proper dyeing. In 1597 the London merchants, desiring the business for themselves, secured the passage of an act driving the Hanse merchants from the city. Staëlyard became corrupted to Steelyard, and still later popular tradition had it that the place was called Steelyard because it was formerly a yard for the sale of steel and iron. Then by a curious, and, we may say, an ignorant, association of terms, for the word is of a wholly different origin, the common steelyard or bar used as a balance in weighing was said to derive its name from its early employment by the Hanse merchants in weighing out steel to their customers. This false history of the word "steelyard" was current for a century.

Steen, Jan (about 1626-1679), a famous Dutch painter, after Rembrandt the most important painter of the Dutch school. He was born at Leyden, entered the university in 1646, and in 1648 assisted in founding the painters' guild. Though little is known definitely about his life, it appears that he was at one time in charge of a brewery, and that at another he was forced by poverty to become an innkeeper in order to gain leisure for painting. Steen painted a few religious and historical subjects, but the people of most of his thousand or more canvasses are beggars, artisans, surgeons, children, peasants—the ordinary but vital people who make up the mass of humanity. Love scenes, tavern scenes, festivals, studies in domestic life—these were his delight; and although he could be bitter at times, delightful geniality and sympathy pervade most of his work. He was a master of color and composition, and his industry is attested by the remarkable number of pictures he left. Some of the finest of these are *The Rustic Wedding, The Oyster Party, Eve of Saint Nicholas, A Merry Company, The Painter's Family* and *The Menagerie.*

Steeplechase, a cross country race for horses and riders. The name is thought to have originated from the custom of racing to a distant church steeple, regardless of intervening ditches, dikes, fields, and streams. The first to touch the church with his riding whip is the winner. It is an exciting, dangerous sort of race, said to be popular in England, especially at fairs or on market day. Each rider is at liberty to take a roundabout way at the risk of losing the race to a more reckless horseman. Variations have been introduced, such as racing to a distant object and back again, setting up flags at certain points between which the riders must pass, etc. See HORSERACING.

Stefansson, Vilhjálmur (1879-), a noted Arctic explorer, was born at Arnes, Manitoba, Canada. He was educated at the University of North Dakota, the Uni-

versity of Iowa, the Harvard Divinity School, and at Harvard Graduate School. Mr. Stefansson, before making his first voyage of exploration, was at various times a farm laborer, a school teacher, a life insurance agent, a public lecturer, a reporter on the Boston *Evening Transcript,* city editor of the Grand Forks, N. D., *Plain Dealer,* and assistant instructor in anthropology at Harvard University. In 1904, he organized a private expedition to Iceland, and in 1905 was given charge of an archeological expedition to Iceland for Harvard University. During 1906-07, Mr. Stefansson made an ethnological expedition to the Eskimo on the mouth of the Mackenzie River and in northern Alaska. For the American Museum of Natural History and the Geological Survey of Canada, he undertook a second Arctic expedition, in 1908-12. On this voyage, the party visited Eskimo tribes whose ancestors nor themselves had never seen a white man. Again in 1913, Mr. Stefansson commanded an Arctic expedition, sailing from Victoria, B. C. With two companions, this daring explorer crossed the Beaufort Sea on moving ice from a point in Alaska to Banks Island. In the same year, he left Cape Bathurst in the *Polar Bear,* and made further explorations of land and water already discovered. Returning in 1918, he was awarded the C. P. Daly medal of the American Geographical Society. Mr. Stefansson is the author of *Arctic Search, My Life With the Eskimo,* and many articles for scientific magazines on geology, philology, folklore and other subjects.

Stein, Heinrich Friedrich Karl, Baron von (1757-1831), a noted German statesman, was born at Nassau. He studied at Göttingen, entered the Prussian civil service, and was appointed head of the department of mines for Westphalia in 1784. Baron Stein visited England in 1786 to make a study of her institutions. He entered the Prussian ministry in 1804 as Minister of Imposts, Commerce and Manufacture. In this office he began the war for reform which he carried on for many years. He was successful in abolishing some of the restrictions on internal trade, but found it hard to make headway against Prussian conservatism. Because he refused the post of Minister of Foreign Affairs under the existing governmental system. and because he was outspoken in his criti cism of the conservatives, he was dismissed from the government in 1807. Napoleon, continuing his work of ruin in Prussia. opened the eyes of the king, who had dismissed the baron, to his minister's wisdom. Baron Stein was recalled after the Peace of Tilsit, 1807. A letter in which Napoleon was censured was traced to Baron Stein. Napoleon ordered the minister's property confiscated, and demanded that the king dismiss him. In 1808, Baron Stein resigned, retiring to Austria. Invited to Petrograd by Emperor Alexander in 1812, the baron accepted, and was active in the coalition of the German states against Napoleon. After the Battle of Leipsic, he was open in his denunciation of Napoleon. During the stirring period preceding the congresses of Vienna and Aix-la-Chapelle, Baron Stein was a leader in all military diplomacy, but his efforts were largely thwarted by the narrowness of the German statesmen. In 1815 he retired, devoting the remaining years of his life to the promotion of German science and art.

Stencil, in the arts, a thin sheet or plate in which letters, figures, or a pattern have been formed by cutting through the plate. By laying the stencil on a surface and applying ink, paint, or other color with a brush, the desired pattern may be transferred to the surface in question. In this way signs may be lettered, shipping directions may be printed, boxes may be labeled, and patterns as for embroidery may be transferred to fabrics. The wall decorator uses stencils for borders of ceilings.

Stephens, stee′venz, **Alexander Hamilton** (1812-1883), an American statesman. He was born in Georgia, and died at Atlanta. He was educated for the Presbyterian ministry in the University of Georgia, but taught school and practiced law. He represented Georgia in both houses of Congress, and for years he was the leading figure in Georgia politics. His particular friends were Robert Toombs of his own state and Stephen A. Douglas of Illinois. He supported the annexation of Texas in

1845, the repeal of the Missouri Compromise in 1850, and the Kansas-Nebraska Bill of 1854. In the election of 1860 he supported Douglas and opposed secession. In the Georgia Convention of 1861, he again opposed secession, yet agreed to the decision of the majority. Later he accepted the vice-presidency of the Confederate States. During the war he was at outs with Jefferson Davis, alleging that the latter was disposed to trample on the rights of the states. In February, 1865, he was at the head of a peace commission that met President Lincoln to no avail in Hampton Roads. After the war he wrote a *Constitutional View of the War Between the States,* as well as other works. He opposed negro suffrage and carpet-bag government. In 1882 he was elected governor of Georgia, a position which he held at the time of his death. In person, Mr. Stephens was slight, never weighing over ninety pounds. He was kindly, courteous, and cheerful. His ideas were those of the patriarchal slaveholder. He upheld slavery and believed that its evils could be eradicated and the institution retained to the advantage of both white and negro. In point of character, ability, and service, Stephens ranks with John C. Calhoun as an eminent son of Georgia.

Stephenson, George (1781-1848), the inventor of the locomotive. He was born in a mining village near Newcastle, England, June 9, 1781, and died at his country seat near Chesterfield, August 12, 1848. He was one of a family of six children, maintained on a colliery engine tender's salary of twelve shillings (three dollars) per week. George's first earning was twopence or four cents a day for herding cows and later fourpence for weeding turnips. When he was able to earn fifteen shillings a week as a fireman, he felt rich and ventured to marry. He studied evenings by the light of his engine fire, mastering reading, writing, and arithmetic steadily. By mending shoes and cleaning watches at odd hours he managed to save a little money. The invention of a safety lamp for mines brought his name before the public.

While still employed in the Killingworth colliery he drew plans for a steam road wagon—the first locomotive. His project found financial backing. In 1821 he was appointed to lay out and construct the Liverpool and Manchester Railway, the first passenger line built. He proposed a speed of twelve miles an hour. "As well trust oneself to be fired off on a Congreve rocket," shouted the *Quarterly Review.* When a speed of thirty-five miles was attained, critics relapsed into silence.

From this time on Stephenson was the leading railway man of Great Britain. The railway company paid him a salary of $10,000 a year. His office was besieged by capitalists eager to enlist his professional services. In the midst of prosperity he remained simple in manner, and, though in position to amass wealth, he remained incorruptible. Investors in railway enterprises felt sure that if Stephenson allowed his name to appear in connection with a scheme that it was managed honestly. Although one of the busiest men in the nation, he insisted to the last on having time off to cultivate his garden, study birds, and, in autumn, to go nut gathering.

His son Robert was the designer of the Britannia Tubular Bridge at Menai Strait and of the Victoria Bridge across the St. Lawrence at Montreal.

See LOCOMOTIVE; STEAM ENGINE; RAILROAD.

Steppe, stĕp, an old world term corresponding in a measure to the prairies of North America and the pampas of South America. A vast tract extending eastward from southeastern Russia is known as the steppe region. It is to be distinguished from forest, mountain, desert, and tundra. A steppe is a fairly level, treeless plain, more or less covered with rich grasses, and affording pasturage for flocks in early summer. Southwestern Siberia, between the parallels of 50° and 55°, and as far as the Obi, is an extensive steppe. Similar steppes are found east of the Altai Mountains and in the great river valleys of eastern Tibet. The steppes pass insensibly into deserts. They are inhabited by nomadic people who move their tents and flocks with the season. Summer drouth is so general that agriculture is practiced only in irrigated districts. The total steppe or semi-arid area of the world is estimated at 13,901,000 square miles. See MONGOLIANS; COSSACKS; RAIN; DESERT; PAMPAS.

Stereopticon. See MAGIC LANTERN.

Stereoscope, an optical instrument used in the examination of double photographic pictures made for the purpose. It was invented by Wheatstone in 1838. The original instrument was based on two mirrors, which have been replaced, however, by two refracting lenses. With the aid of this instrument two photographic pictures, a left hand and a right hand view, are examined at the same time, one by each eye, so that they make an impression of one picture. In this way a picture may be made to stand out more clearly. Surfaces appear in relief instead of flat, and relative distances are shown up better than by the examination of a single photograph, however clear it may be.

Stereotype, a cast in type metal of a page of type for use in printing. The process as now mainly used is known as the papier-maché process. A moist layer of this material is pressed against a page of type in a steam-heated press and kept there till dry and baked. This matrix is then removed and molten type metal poured over it, which, when trimmed, is ready for the printing press. The matrix may be kept for making other plates. For newspaper work the stereotype plates are cast so as to fit the cylinders of their great presses. It takes but five minutes to make the stereotype complete.

Sterne, stẽrn, **Laurence** (1713-1768), an English novelist. A soldier's son, he was born in Flanders and followed the regiment until he was placed at school in Halifax, Yorkshire. He was educated at Cambridge, England, for the church. He was a quiet country clergyman for twenty years. Two books have made him famous. *Tristram Shandy,* drawn from boyish observations in his father's regiment, is a story of Corporal Trim and Uncle Toby, a delightful combination of characters. *A Sentimental Journey* gives his observations on a journey through France and Italy. Sterne was a humorist and had a delicate touch, but inasmuch as his works partook of the coarseness of the time, he is grouped in that respect with Fielding and Smollett. "God tempers the wind to the shorn lamb," is credited to him. See SMOLLETT; RICHARDSON; FIELDING.

The accusing spirit, which flew up to heaven's chancery with the oath, blushed as he gave it in; and the recording angel as he wrote it down dropped a tear upon the word and blotted it out forever.—*Tristram Shandy.*

Stettin, a city of northern Germany. It is the capital of the province of Pomerania. Stettin is situated on the Oder at the head of deep-water navigation. It is one of the chief seaports of Germany. Over 5,000 ships tie up at its wharves yearly. There is a large trade in wood, herrings, coal petroleum, grain, potatoes, cement, spirits, and wine. There are manufactures of sugar, chemicals, and machinery. There are important shipyards. The city had a population in 1921 of 232,726. Stettin when first known was a settlement of the Wends. It was a Hanseatic town in the Middle Ages. Sweden claimed the city, 648-720, since which time Stettin has been a city of Prussia. There are several buildings of importance, including a castle and churches notable for their architectural features.

Stettler, Alberta, a commercial and industrial town, is 155 miles northeast of Calgary, on the Canadian Northern and Canadian Pacific railroads. It is the distributing point for a rich mixed farming region, and has manufactories of flour and grist, cigars, foundry and machine shop products and sash and doors.

Stettler has agricultural fair grounds, a race track, two hospitals, five churches and good schools. The electric light and water systems are the property of the municipality. There is also a $12,000 municipal skating rink. In 1921 the population was 1,416.

Steuben, stū'ben, **Baron** (1730-1794), a Prussian soldier. He was born at Magdeburg. He was an officer of Frederick the Great in the Seven Years' War. At the outbreak of the American Revolution, he came to America and joined Washington. Congress appointed him inspector general. His services in drilling our raw militia were invaluable. Somewhat tardily, Congress gave him an independent command. He commanded the left wing at Monmouth and led forward the trenches to the last at the siege of Yorktown. His name is associated with that of Lafayette as a supporter

of the American cause. At the close of the war he retired to a grant of land near Utica, New York, and ended his days there. See LAFAYETTE.

Steubenville, Ohio, a city in Jefferson County, on the Ohio River, 43 miles from Pittsburgh, Pa. The Pennsylvania, Wheeling & Lake Erie and the Pittsburgh, Cincinnati, Chicago & St. Louis railroads enter the city.

Steubenville is an industrial and commercial center. In the vicinity rich coal deposits, petroleum and natural gas are found. The manufactures are varied, including steel and iron products, chimneys, glassware, electric light bulbs, paper and foundry and machine shop products. The city presents a bustling, modern appearance, with well paved streets, lined with some fine office buildings and residences. The public utilities are owned and operated by the city. Steubenville was named for the famous soldier, Baron Friedrich Steuben, and a fort was erected here in 1787 in his honor. Population, 1920, 28,508.

Stevens, Thaddeus (1792-1868), an American statesman, born in Danville, Vermont. He was graduated from Dartmouth College, and after being admitted to the bar he practiced in Gettysburg and Lancaster, Pennsylvania. He served in the legislature as a Whig and in 1848 he was elected to Congress. He represented strong northern interests and manifested this by his opposition to the Fugitive Slave Law and the Kansas-Nebraska Bill. He was reëlected to Congress in 1858, remaining the acknowledged leader of the House until his death. He led the impeachment of Andrew Johnson, being chairman of the Committee on Reconstruction and also chairman of the House Committee to which was entrusted the impeachment. Stevens was radical in his support of measures that he favored, but his speeches, though bitter and satiric, were just and discriminating.

Stevenson, Robert Louis Balfour (1850-1894), a Scotch poet, essayist, and novelist. He was born at Edinburgh, November 13, 1850. He died in Samoa, December 3, 1894. His father and his grandfather were lighthouse engineers. Grandfather Stevenson built no less than eighteen lighthouses, including that on the Bell Rock in 1807-10. He was the architect besides of numerous docks, breakwaters, and bridges. Robert was a graduate of the University of Edinburgh and a member of the Scottish bar. Instead of practicing, however, he, like Scott, turned his attention to literature. His style is remarkable for clearness, simplicity, sincerity, and an attractive play of humor. Stevenson is thoroughly original, both in his use of material and in his expressions. It is interesting, therefore, to know that he acquired his manner of writing by imitating with care the writings of others,—"playing the sedulous ape," he called it.

His contributions were welcomed by the editors of the *New Quarterly, Macmillan's, Cornhill Magazine,* and other periodicals. His earlier volumes are *An Inland Voyage* and *Travels with a Donkey in Cevennes.* Both are delightful. *Virginibus Puerisque and Other Papers* is a series of papers addressed to girls and boys. *Familiar Studies of Men and Books* is a collection of magazine articles, including bright essays on Hugo, Burns, Whitman, Thoreau, Villon, Pepys, and Knox. *Treasure Island* and *The Black Arrow* are unsurpassed tales of adventure. *Kidnapped, The Master of Ballantrae,* and *David Balfour* are adventurous tales of high rank. In 1885 he published *A Child's Garden of Verse,* remarkably expressive of children's thoughts and feelings. A number of his novels are of a psychological nature. The most successful of these is *The Strange Case of Dr. Jekyll and Mr. Hyde.*

Stevenson was never a robust man. In the search for health he resided for a time in the Adirondacks and in the mountains of California. Finally, his physician having ordered him south, he went to the southern Pacific and established a home on the island of Samoa. He was an eager writer, full of vivacity and fond of life. Although he knew that his years were almost numbered, he wrote on courageously, maintaining that one should meet death as cheerfully as though it were one of the pleasures of life.

See SAMOA.

To be honest, to be kind, to earn a little and to spend a little less, to make upon the whole a family happier for his presence, to renounce when that shall be necessary and not be embittered, to keep a few friends, but these without capitulation; above all, on the same grim condition to keep friends with himself—here is a task for all that a man has of fortitude and delicacy.

Little do ye know your own blessedness; for to travel hopefully is a better thing than to arrive, and the true success is to labour.

Stickleback, a family of small, active, greedy, quarrelsome fishes. The name is derived from two, four, or ten sharp spines, according to the species, that take the place of the dorsal fin. Gray, black, or olivaceous, they are found in brackish waters. The common two-spined stickleback is about seven inches long. It is worthless for food.

Stickseed, a plant of the borage family. A more common name is beggar's lice. The name is due to from one to three rows of prickles or hooks which arm the seeds, causing them to adhere to clothing, the hair of animals, etc. The hooks are one of Nature's devices for scattering the seeds. The seeds catch in the wool of sheep and make clots which give no end of trouble to the wool spinner. The most common American stickseed is known to botanists as *Echinospermum Virginicum,* meaning the Virginian hedgehog seed. This weed has minute blue flowers which remind one somewhat of the forget-me-not. The stem and leaves are hairy.

Stilicho, Flavius (359-408), a celebrated Roman general and statesman. His father was a Vandal chief who had entered the service of the emperor Valens. Stilicho rose to high rank in the army through his military ability, and, when he had satisfactorily performed an important mission to Persia, the Emperor Theodosius the Great gave his niece in marriage and made him commander-in-chief of the Roman army. On the death of Theodosius the empire was left to his two young sons, Arcadius to rule in the east and Honorius in the west. Rufinus, who had been minister of Theodosius and the enemy of Stilicho, was guardian of Arcadius, while Honorius was intrusted to the care of Stilicho. Rufinus instigated the Visigoths, under their king, Alaric, to an invasion of Greece while Stilicho was engaged with his enemies in Gaul. Stilicho at once set out for Constantinople and destroyed his rival in 395. He drove Alaric out of Greece in 396, and four years later repulsed him from northern Italy. Stilicho was accused of forming an alliance with Alaric, in the hope of being able to introduce his own family to the imperial succession. Historians differ as to the truth of this accusation, but, at all events, Stilicho was obliged to flee from Rome.

Stirling, stĕr'ling, a city of Scotland. It is situated on the River Forth, about thirty-six miles from Edinburgh and thirty from Glasgow. A bridge across the Forth at this place was for centuries a point which the Highlanders must pass on their way to the Lowlands, giving rise to the old saying, "Forth bridles the wild Highlander." Stirling Castle, perched on a high crag, was known as "Gray Stirling, bulwark of the North." The castle was a favorite place of residence of Scottish kings. Alexander I died here in 1124. James II and James V were born here. James III built a parliament house, thus making Stirling for the time the capital of Scotland. The articles of union between England and Scotland stipulate that the fortifications of Stirling shall be maintained. Another building of interest is the old Gothic church of Greyfriars, dating from 1494. The state religion of Scotland was changed officially from Catholicism to Presbyterianism in this historic building. The castle commands a magnificent view of the Vale of Menteith, Ben Lomond, Ben Venue, Ben Ledi, Ben Voirlich, and Dunbar. The closing scenes of Scott's *Lady of the Lake* are laid in Stirling Castle. During the early history of Scotland the castle was taken more than once by the English. In 1304 Edward I was obliged to send back to the Tower of London for besieging implements and reinforcements before he was able to take the fortress. The modern town at the foot of the crag has a population of 18,000 and is the seat of important woolen manufactures. The field of Bannockburn is but two miles distant. See DOUGLAS; JAMES.

Stock, a term used to represent the capital of a corporation or of a stock company. The term is pluralized if applied to

the capital of more than one company. The capital is divided into equal shares which are sold to persons wishing to invest, each investor receiving a certificate of stock as proof of his share in the business. Stock may be issued by a corporation or by an association in a manner prescribed by law, the laws varying somewhat in different states. There may be different kinds of stock as, common, preferred, or special. Holders of common stock have rights in the management and profits of the company in proportion to the number of shares held. Usually each share has a vote in the election of directors and on any other question which may properly come before the stockholders. The common stock is entitled to all net profits after debts and preferred dividends have been paid. Preferred stock usually draws a fixed rate of dividend and has no vote. Its dividends must be paid before the common stock receives anything, its holders are exempt from liability, and it has first claim on the assets in case of winding up the company's affairs. Special stock may combine features of the common and preferred as specified in the articles of incorporation of the company.

It will be seen that to the investor in stocks who cares more for safety, freedom from responsibility, and certainty of return, the preferred is more attractive, while to one desiring control or who believes the business will yield large profits, the common looks better. Stock is considered as personal property and may be transferred by proper assignment of the certificate. Shares of stock may be for any amount, but are commonly $100 each. Stock is said to be at par when it will sell at its face value, at a premium when above, and at a discount when below. The price of stock depends mainly upon the success of the company and the amount of income it yields, but this often fluctuates according to the plentifulness of money for investment. Sometimes a desire for control causes an abnormal demand for some particular stock and thereby advances the price. A situation of this kind caused Northern Pacific stock to sell as high as $1,000 for a $100 share. The stocks of railroads, manufacturing, mining, and other large companies are bought and sold very extensively. The traffic is so great that every prominent city has its organization of brokers called a stock exchange, while numerous outside dealers called curb brokers operate independently. The purchase of stocks has become so popular with the public in later years that often companies of enormous capitalization are formed and their stock floated within a short time.

The exchange of stocks has long been the cause of much speculation even among legitimate brokers and investors, while the so-called bucket shops and other irresponsible dealers often unload fictitious or worthless stocks on the unsuspecting public. When brokers combine to advance prices they are said to *bull* the market. When they arbitrarily depress prices they are called *bears*. Much buying is done on *margin* for future delivery, the investor paying only a per cent of the market value to cover possible fluctuations and expecting to sell his *option* before delivery is made. Stocks are often sold *short,* which means selling stock one does not have on the expectation of being able to buy at a lower price in time to make delivery. Stock brokers charge a commission both for buying and selling of usually one-eighth per cent.

See CORPORATION; STOCK EXCHANGE.

Stock Exchange, an association organized to provide a market for bonds and stocks. The leading stock exchanges of Europe are the London Exchange, the Paris Bourse, and the Berlin Börse. There are many others, as at Vienna, Hamburg, Frankfort, Manchester, Glasgow, etc. In this country there are exchanges at New York, Philadelphia, Boston, Chicago, Pittsburg, Baltimore, Cleveland, Cincinnati, Detroit, New Orleans, Denver, Indianapolis, San Francisco, Washington, Kansas City, Los Angeles, Providence, and Richmond. There are also exchanges at Toronto and Montreal in Canada.

So far as the volume of business goes, the New York Stock Exchange is not only the largest on this side of the Atlantic but the largest in the world. The sales of stocks average $225,000,000 shares, and of bonds to $3,000,000 annually. This exchange may be described as typical. It has grown rapidly. As early as 1752 a few

business men used to meet informally under a tree on Wall Street near Pearl. In 1792 an association was formed to maintain a uniform rate of commission. The present exchange was organized in 1817. It occupies a building of its own on Broad Street.

The exchange is no place for a poor man. The membership of the New York Exchange is limited to 1,100. Vacancies may occur through death, bankruptcy, resignation, or expulsion. A seat may be sold like any other piece of personal property. Membership is known as a "seat upon exchange." Between 1885 and 1920 the price of a seat has varied from $34,000 to $115,000, with one drop in 1896 to $14,000. The prospective member must be a citizen of legal age, he must secure the approval of two-thirds of the members of the committee on membership, and is required to pay an initiation fee of $1,000. Members who buy and sell for others are known as brokers. Those who trade on their own account may be termed operators, but there is comparatively little business done at first hand. Large traders prefer to deal under cover of a broker. The charge for selling or buying is known as brokerage or commission. A uniform rate is prescribed. The commission for buying or selling 100 shares of the par value of $10,000 for an outsider is $12.50. The charge for performing the same service for a member whose name is withheld is one-fourth that amount. A member trading for a member whose name is given up charges but $2 per $10,000. Bankers seek membership to cut down the cost of brokerage. Brokers accept orders from any responsible parties. They are in business for that purpose. Business is done on the floor of the exchange in an informal way. There is a chairman, but his duties are confined to declaring the exchange open and to making announcements, such as the insolvency or the death of a member or a call for a business meeting. Members are admitted every business day at 9:30 A. M. Trading begins at 10 o'clock; 3 P. M., or on Saturday 12 M., is the closing hour. There are several "posts" or boards on which the prices and transfers of the more active stocks are posted by an attendant. Business is done chiefly in front of the posts. Prices are made in fluctuations of one-eighth of one per cent. If a broker hears no reply to his offer of Rock Island Preferred 48⅜, he may call again at 48¼, amounting to a drop of $12.50 per $10,000, but he must drop by the prescribed fluctuation, one notch at a time. A hundred telephones keep the brokers in communication with their employers. Competent clerks keep track of the market, and a telegraphic service records significant transactions in some 1,800 city offices. Each of these offices receives this information through a telegraph instrument known as a "ticker." Each ticker prints the information on a ribbon of paper that passes through the device and falls into a basket beneath. By reading his "tape," a banker can note the fluctuations of the market and telephone orders to his broker accordingly. No stocks are actually exchanged on the floor. The brokers make note of trades on pads of paper, and telephone the transactions to their respective offices. Actual delivery must be made by 2:15 P. M. of the day following, or the delinquent is dishonored and his seat may be declared vacant. The buying broker must be prepared to pay or go into bankruptcy.

A committee on the stock list decides what stocks may be placed on the exchange list. These stocks are looked up with care and are such as the brokers are willing to accept as securities for loans. Members are forbidden to sell unlisted stocks on change, nor are they allowed to trade in listed stocks except on the floor of the exchange. This latter rule is aimed to prevent large transfers without the knowledge of the financial world. The trading that is carried on in unlisted stocks and by brokers who are not members of the exchange is said to be transacted on the "curb," a term applied to an unorganized market near the stock exchange.

A large part of the sales on exchange are purely speculative, mere stock gambling. The selling brokers actually sell and deliver. The buying brokers actually buy and pay, but the stocks are deposited with a banker to secure a loan. The speculating purchaser is required to put up such a part of the purchase price as may be agreed upon. If the stock goes down in value, the buyer is required to put up more money or else his stock is sold. If the stock in question

goes up the purchaser may order his broker to sell and remit the profit. It may be stated as a rule that outside parties who do not want the stocks and bonds for an actual investment should let the stock market severely alone. Otherwise their small earnings and savings are absorbed quickly by the broker who is in business for that purpose.

The New York Exchange is modeled largely on the London Exchange. The Paris Bourse consists of seventy members approved by the French minister of finance. Each member is held financially responsible, not only for his own transaction, but for the transactions of the other sixty-nine members. The members are brokers only. They are forbidden to buy or sell on their own account. They settle once every two weeks instead of the next day. There is also a Paris "curb," the transactions of which surpass those of the Bourse in volume. The Bourse circle is known as the parquet by way of distinction. The Berlin Exchange or Börse is democratic. Any one may buy or sell on payment of a small fee.

Stockholm, the capital city of Sweden. It is situated on a group of islands in Lake Malar, an inlet of the Baltic. It is sometimes called the Venice of the North. The islands are connected by numerous bridges and frequent steam ferries. Miles of wharves accommodate a large outgoing trade in woven goods, beet sugar, tobacco, iron ware, machinery, porcelain, pottery, iron ore, copper, tar, and lumber. Wine, salt, and fruit are imported. One of the most noticeable buildings is the Royal Palace. It is a symmetrical, flat-topped, three-story building occupying a block or two. The street front is adorned with Corinthian pillars. The Church of St. Nicholas, in which Swedish kings are crowned, dates from 1264. Of similar historic interest is the Old Church, known as the Riddarsholm Kyrka, the Westminster Abbey of Stockholm, in which generations of royal personages have been laid away. Other buildings are the National Library containing a quarter of a million bound volumes and several thousand priceless manuscripts; the National Museum with a rich store of coins and antiquities; Houses of Parliament; and various government buildings including the mint, arsenal, and barracks. An exchange and a town hall relate to city life. Pleasure finds expression in theaters, an opera house, delightful promenades, excursion crafts, and recreation gardens. There are numerous societies,—medical, musical, artistic, scientific, and horticultural. The Ethnographical Museum contains a fine collection of Scandinavian antiquities—ancient boats, coins, weapons, and utensils. Zoölogical gardens are maintained on some small islands. The home station of the Swedish navy is here. The approach to the city is defended by heavy artillery. The population in 1921 was 419,429. See SWEDEN; BALTIC; UPSALA.

Stockinet, a general name given to plain fabrics made on the knitting machine. The name is a corruption of stocking-net. Stockinet is made of cotton, linen, silk, or wool. Wool stockinet is often called jersey cloth. Stockinet is used in the manufacture of hosiery and underwear.

Stocks, a contrivance for the confinement of vagrants, drunkards, and other petty offenders. It consisted of two or more horizontal timbers resting in a frame. The cracks were enlarged at intervals into holes suitable to confine the ankles or wrists. In use, the upper timber was raised, the offender was caused to assume a sitting position, his legs or arms, and sometimes both, were placed in these holes and the timber was fastened down in place. The stocks were common in Europe and even in England until a late date. Imprisonment in the stocks was a usual form of punishment in New England. Cases of placing a man in the stocks for failing to attend church were not uncommon. The antiquarians of Salem, Boston, and other New England towns still point out the place where the stocks used to stand. Imprisonment in this manner was degrading rather than painful. See PILLORY.

Stockton, Cal., an industrial city and the county seat of San Joaquin County, is 78 miles east by north of San Francisco, at the head of navigation on an arm of the San Joaquin River. It is served by three important railroads. Stockton is the principal market for a large agricultural and stock raising district, and contains about

twenty grain and produce warehouses. The famous peat lands adjoining on the west are the richest in the world. The soil received first prize at the St. Louis Exposition. It is supplied with an abundance of hydro-electric power, and its chief manufactures are agricultural and mining machinery and implements, tractors, poultry and stock feed, combination threshers, bean threshing machines, dredges and ditching machines.

The city contains Saint Agnes College, high schools and academies, the new College of the Pacific and a splendid public library. The state hospital for the insane is here. Stockton was founded in 1847, and was named for R. F. Stockton, of the United States Navy. It is one of the most prosperous and beautiful cities in the beautiful state of California. Population in 1920, 40,206.

Stockton, Francis Richard (1834-1902), an American author. He was a native of Philadelphia. After receiving a secondary education in the schools of his native city, he learned the business of wood-engraving. At thirty-eight he obtained a position in the editorial corps of the Philadelphia *Post*. Later he was connected with *Hearth and Home* of New York, *Scribner's Monthly,* and *St. Nicholas*. In 1879 he gave *Rudder Grange* to the press. It is an odd, whimsical account of an imaginary houseboat outing. Other volumes in the same quaint vein are *The Casting Away of Mrs. Lecks and Mrs. Aleshine*, and its sequel, *The Dusantes*. *The Great War Syndicate, Squirrel Inn,* and *The Adventures of Captain Horn* are equally interesting. Among his short tales are *The Lady or the Tiger, The Terminal Moraine,* etc.

Stock-Watering, the issuance and sale of additional stock without making a corresponding increase in the investment. If the owner of a mine finds that a total investment of $10,000 is bringing him in a profit of forty per cent, or $4,000 a year, it is probable that he can sell a half interest for more than the whole cost. If we concede that individuals should be allowed to own mines, we must concede again that the sale is a legitimate private transaction in which the public has no concern. If, as we may suppose, the mine be in a galena district, it plays so small a part in fixing the price of lead that the public is not interested in the question of who bought the half interest nor how much was paid for it. There are many enterprises of a semi-public character of which the ownership and the cost of ownership are matters of public concern for the plain reason that these enterprises serve the public and charge the public. Public gas companies, electric light companies, water supply companies, railroads, express companies, and street car companies are of this character. There is no question that public service should be paid for by the public. In the case, let us say, of a lighting plant, fairness demands that the price paid for gas should include:

1. Interest on the actual and necessary cost of the plant.
2. The cost of material consumed, coal, etc.
3. The cost of operation, including wages and salaries.
4. Proper charges for superintendence—expert supervision is expensive.
5. The cost of repairs.
6. The annual wear and tear and deterioration. Not infrequently it is found best to dispose of old machinery.
7. A reasonable additional profit to induce investors to put in their money.

In case a plant, the shares of which are listed at a total of $20,000, is able to show a large profit of say $5,000 a year over and above all proper costs, the public is likely to demand a reduction in the price of light. A favorite method of forestalling such a demand is the issuance of additional stock. If, for instance, the stock be increased to a par value of $100,000, each of the original owners is entitled to receive four shares in addition to each original share he may hold. This stock he may sell or hold, it matters not which, but the public is told that a $5,000 yearly profit on $100,000 worth of stock is not excessive. The shrewd observer cannot fail to see that the public is called upon to pay profits on watered stock. Put into modern language, a price below the cost of service is confiscation; a price or rate providing profits on watered stock is plunder.

The watering of railroad stocks in particular has been carried to an outrageous extent. Manipulators have gained control of railroads and have put watered stocks into their pockets. In 1920 $223,931,350 shares of stock and over $3,950,000,000 of bonds, face value, were sold on the New York stock exchange. On one day, April 30, 1901, at the climax of a period of excitement and speculation, 3,200,000 shares of stock changed hands. It is improbable that anybody can determine the amount of water in the stock of the country. Whenever it is proposed to force companies to base rates and prices on the present value of plants instead of on the inordinate face value of the stock outstanding, the cry is raised that the stock has passed into the hands of thousands of innocent purchasers whose income would be confiscated. In the case of many successful enterprises, the original promoters have sold watered stock to the public, have taken their own money out, and are yet large stockholders. The public pays the bills.

To cite an example—which might hold for any large company in any year—: In 1919 the Wells-Fargo Express Company had decided to increase its capital stock from $8,000,000 to $24,000,000. The new issue of $16,000,000 was offered to stockholders to whom stock dividends of $300 a share were declared. This action was taken by the directors subject to the stockholders' approval at a meeting held December 22, 1909. The dividend plan gave each stockholder funds for the purchase of two shares of stock at par and $100 in cash for each share he owned.

Stockyard, in animal industry, a live stock market, especially a market provided with railroad facilities. The essential features of such a market are pens into which stock may pass by gangways from the stock cars; and facilities for sheltering, feeding, and watering until the animals are sold. Ordinarily each pen has its loading chute. A continuous, narrow loading platform runs the length of the track. A long train load of animals of all sorts may be sent down the gangways, watered, and fed in an incredibly short time, each car or lot of stock being kept separately in its own pen.

The principal stockyards of the United States may be named in three groups: Chicago, Kansas City, Omaha, St. Paul, Sioux City, St. Joseph, Denver, and St. Louis; Cincinnati, Indianapolis, and Cleveland; New York, Boston, Buffalo, and Pittsburg.

The stockyards of Chicago are considered the greatest live stock market in the world.

Stoddard, Richard Henry (1829-1903), an American poet and journalist. He was a native of Massachusetts. He went to New York while young, and for some time worked in an iron foundry. He soon began contributing short articles and poems to various periodicals and finally devoted his time entirely to literature. He was literary reviewer for the *World,* and later for the *Mail and Express,* in which capacity he did a vast amount of critical work and won a deserved reputation for careful and discriminating judgment. Among his books may be mentioned *Footprints, Songs of Summer, The King's Bell, Life of Washington, The Lion's Cub,* and *Under the Evening Lamp.*

Stoddard, William Osborn (1835-), an American writer and journalist. He was born at Homer, New York, and was a graduate of the University of Rochester in 1857. Stoddard tried farming and reporting. In 1861 he served three months in the United States volunteers. He served President Lincoln in the capacity of private secretary 1861-4. Stoddard has written a number of interesting books of adventure and stories for boys. Named in order of their appearance, the more important are *Life of Abraham Lincoln, The Talking Leaves, The Red Mustang, The Lost Gold of the Montezumas.*

Stoics, stō′ĭcs, a school of Greek philosophers. Zeno, a native of Cyprus, was the founder of the school. He died about 264 B. C. The word Stoic is from the Greek signifying a porch, having reference to the painted porch or portico in the Agora at Athens which Zeno and his followers frequented. He taught that the supreme end of life is virtue, and that virtue should seek expression in action. The Stoics were the Puritans of Greece. They held that the performance of duty is the result of wisdom; that joy and grief should be without outward manifestation: that action should

be governed by a sense of duty, not by inclination. The wise man, according to his belief, is not without feeling, but he is without passion. In the performance of duty he spares neither himself nor others. In matters of opinion each man is his own judge and is inferior to no one. Socrates was a Stoic. So were the Roman Cato, Seneca, and Marcus Aurelius.

Stomach. See ALIMENTARY CANAL.

Stone Age. See ARCHAEOLOGY.

Stonehenge, the imposing remains of an ancient place, possibly of Druidical or even more ancient worship, nine miles north of Salisbury, England. A number of moss-grown stones, sixteen feet in height and six feet in thickness, stand on end in two rings, one within the other. The outer circle is 105 feet in diameter. Flat stone slabs lying across the tops still connect a few of the pillars. It is conjectured that the roof may at one time have been complete. At the center are the remains of an ellipitical altar or sacred spot where the priests possibly went through their mysteries while the people stood far without in a sort of public square. An earthen wall fifteen feet high, a ditch thirty feet wide, and an inner wall surround the whole with a single avenue by way of entrance. The avenue divides without, one branch leading to burial mounds, the other to the public place mentioned. Antiquarians are at a loss to assign the remains of Stonehenge as to time, purpose, or people.

Storage Battery. See BATTERY.

Stork, a wading bird akin to the heron and the bittern. An American stork, frequently called the wood ibis, forty inches long, with greenish black wing covers and tail, breeds as far north as Kansas and New York. The stork of literature and the nursery is an Old World bird, breeding especially in Holland and as far north as Scandinavia. It winters south of the Mediterranean. The prophet Jeremiah says "The stork in the heaven knoweth the appointed time." The stork feeds in fens and lowlands on frogs, eels, small fishes, snakes, mice, and offal. In the Netherlands it destroys animals that weaken the dikes. It is protected by law. Many cities of the Low Countries encourage the stork as a public scavenger. The peasantry believe that a stork's nest on the house brings good luck. "The storks have brought a baby brother" or "a baby sister" is the pleasing announcement in a German household. Says Field:

> Last night the stork came stalking—
> And stork, beneath your wing
> Lay, lapped in dreamless slumber,
> The tiniest little thing;
> From Babyland out yonder
> Beside a silver sea
> You brought a priceless treasure,
> A gift to mine and me.

The stork was well known in Palestine, being held as a clean bird. The Psalmist says, "As for the stork, the fir trees are her house."

Storms. See CYCLONE; TORNADO; WEATHER BUREAU; ANEMOMETER; BAROMETER.

Storthing, stôr'tĭng. See NORWAY.

Story, Joseph (1779-1845), an eminent American jurist. He was a native of Marblehead, Massachusetts. He received his degree at Harvard in 1798 and began soon afterward to practice law. He held various public positions. In 1808 he was sent to Congress. In 1811 he was speaker of the Massachusetts House. The latter year he was appointed associate justice of the United States supreme court. In this capacity he was an associate of Chief Justice Marshall, with whose views his own coincided. He also held a professorship of law in Harvard from 1829 until the time of his death. His lectures, published in book form, are authoritative. They have a wide use in schools of law. The title of chief interest to the ordinary reader is the *Commentaries on the Constitution of the United States.* Others are *The Conflict of Laws, Equity Pleadings, Equity Jurisprudence, Law of Partnership, Law of Promissory Notes,* etc.

Story of a Bad Boy, The, an autobiographical story by Thomas Bailey Aldrich. See ALDRICH.

Stovaine. See ANAESTHETIC.

Stove, a well known household necessity. Cast iron stoves were made in Alsace, Germany, as early, it is thought, as 1490; but prior to the eighteenth century European heating stoves were ordinarily large tiled affairs. The Nuremberg stove required hours to become heated and hours more to

cool off. In fact the high earthenware stove is still in use in Germany and Russia. In the latter country the peasants sleep on it for warmth.

The American colonists depended on open fireplaces and brick ovens. Pots were hung over an open fire in the fireplace by a crane, an iron rod hinged to the wall so as to swing to and fro. The pots and kettles were suspended from the crane by S-shaped pothooks. Potatoes were roasted in the hot ashes. Bread was baked in a covered pot swung over the fire, or else in a brick oven with an iron door. In case of the latter the oven was first heated by building a fire inside of it. When the dough was ready to bake, the coals and ashes were removed from the oven, the loaves placed inside, and the door closed again. Baking day was an event in the household. In place of warming churches by a stove or furnace the colonists expected each old lady to be provided with a foot-stove or foot-warmer, such as are carried nowadays on a cold drive. A common form of foot-stove was a small sheet iron box, well encased. It was provided with a shovelful of live coals from the fireplace and was carried to church by a bail.

A heating stove with an open front was invented by Dr. Franklin in 1744. Box stoves of six iron plates, a top, a bottom, two sides, a rear, and a front door date from 1752. Attachments for baking, holes for kettles and frying pans were afterthoughts. The cooking stove superseded the fireplace about 1819. A history of the various improvements and patents would fill volumes. The modern wood heater is a combination of cast iron and sheet iron. The more expensive cooking ranges are built of steel plates. Coal stoves are provided with mica plates for greater cheerfulness. In cities gas stoves have replaced coal stoves for cooking.

Stoves are manufactured in more than twenty-five states. Ten states manufacture stoves to the value of over a million dollars a year, but the American industry may be said to center in Detroit.

See FIRE; HEATING AND VENTILATING.

Stowe, stō, **Harriet Beecher** (1811-1896), an American novelist. She was born at Litchfield, Connecticut. She was the sister of Henry Ward Beecher and the daughter of Dr. Lyman Beecher, a Congregational clergyman, later the president of Lane Theological Seminary at Cincinnati. In 1836 she married Calvin E. Stowe, professor of Hebrew at Lane, and later the occupant of a similar chair at Andover Theological Seminary.

As early as 1843, Mrs. Stowe published the *Mayflower,* a volume of Pilgrim tales previously contributed to periodicals. During 1851-1852, she contributed *Uncle Tom's Cabin,* a tale of negro slavery, to the pages of the *National Era* of Washington, D. C. It attracted ordinary notice as a serial, but, on republication in book form, it became the most widely and generally read book of the quarter century. Half a million copies were sold in the United States inside of five years. The sales in Great Britain were on a corresponding scale. It was translated into no less than nineteen foreign languages. Slaveholders were furious, claiming that the evils of slavery, the whipping of slaves, the parting of families, and the helplessness of young negro women were exaggerated beyond all reason. Unquestionably, the tale stirred up anti-slavery sentiment and may be regarded as a powerful though indirect cause of the Civil War. No other publication of the anti-slavery period of agitation had so great an influence in convincing political leaders that a free North and a slave South could not get on under one government. *Uncle Tom's Cabin* has been dramatized and is still a favorite theme on the stage. Of American plays, it competes with *Rip Van Winkle* in popularity.

Nina Gordon, or *Dred,* a tale of the Dismal Swamp, a second anti-slavery novel, considered by many a better piece of literary work, had only fair success. Mrs. Stowe then betook herself to her natural field, the writing of domestic New England tales. Named in order of appearance, the chief titles are *The Minister's Wooing, The Pearl of Orr's Island, Old Town Folks, Pink and White Tyranny, My Wife and I.*

In 1853 Mrs. Stowe went abroad and, on returning, published a volume of travel. She died at Hartford, Connecticut, July 1, 1896.

See ANTI-SLAVERY PARTY.

Strabo (63 B. C.-24 A. D.), a noted Greek geographer. The name is akin to strabismus and means squint-eyed. Strabo traveled extensively throughout the part of the world then known. He wrote a treatise on geography in seventeen books. Two books were devoted to a general introduction summarizing the knowledge of previous writers. He describes the earth as a globe standing still in the center of the universe. The moon, sun, and stars revolve about it. The habitable portion is a belt extending from Ireland to Ceylon, India. Outside of these limits, the world, according to Strabo, was inhabited by monsters. Eight books were devoted to a description of Europe, six books to Asia, and one book to Egypt and Lydia. See GEOGRAPHY.

Stradivarius. See CREMONA.

Stramonium, a common thorn apple. It is a stout, ill-scented weed widely diffused on both sides of the Atlantic. In Virginia the stramonium is called Jamestown weed or jimson weed. A powerful drug is extracted from the leaves and seeds. This extract is a narcotic, and has much the same effect as belladonna, to which, indeed, stramonium is a near relative. The drug, stramonium, is a remedy for convulsions, epilepsy, and certain forms of mania. The leaves are smoked to relieve asthma. It is said that the priests of the Delphic oracle took stramonium to produce the frenzy with which they were supposed to be inspired.

Strand. See HYDE PARK.

Strasburg, sträs'bōōrg, France, the capital of Alsace-Lorraine. It is situated on a plain at the junction of two small streams, two miles east of the Rhine. It is a railway center and a manufacturing city of over 178,000 inhabitants. The principal manufactured articles are beer, leather, tobacco, dyes, sausages, fat goose-liver pies, sauerkraut, clothing, etc.

The city was taken from the Germans by the French in 1681. At the conclusion of the Franco-Prussian War in 1871 it again passed to Germany. At the close of the World War it went back to France. The University of Strasburg, founded in the seventeenth century, has an observatory and a library of 600,000 volumes.

The city possesses one of the most noted cathedrals in Europe. It was founded in the eleventh century and was three hundred years in building. The earlier parts are Romanesque in style. The newer portions are Gothic. The western façade or front is entered by three magnificent portals adorned with rich sculptures, representing scenes from the history of the creation and redemption. These portals are considered among the finest examples of Gothic doorways in existence. The façade contains also a fine rose window forty-two feet in diameter. The nave or main portion is 363 feet long and 135 feet wide. It is 100 feet in height and is lighted by gorgeous medieval stained glass windows. A spire of delicate open stonework tapers to a height of 468 feet. It is exceeded in height by the steeples of Cologne only. The main roof or platform of the church, at a height of 216 feet, commands a magnificent view of the surrounding country. Strasburg was an active center of the French revolutionary forces in 1793. Several hundred statuettes were ignorantly torn down and destroyed by the French soldiers as emblems of tyranny. The cathedral was also damaged by cannon during the siege of 1870, but all traces of injury have been removed. The cathedral contains one of the most remarkable astronomical clocks in existence.

See CLOCK; CATHEDRAL; ARCHITECTURE; MARSEILLAISE; GUTENBERG; ALSACE-LORRAINE.

Stratford. See SHAKESPEARE.

Stratford, Ontario, an industrial center and the county town of Perth County, is on the Avon River and on the Grand Trunk Railroad, 88 miles west of Toronto. The Grand Trunk has building and repair shops here, and from the numerous factories in the city issue, beds, ladders, felt shoes, furniture, steel bed springs, hoops and staves, clothing, threshing machines, music cabinets, dairy supplies, harness specialties, traction engines, flour, bricks and tile and corrugated drain pipes. Three large mills make knit goods, socks, stockings, sweater coats, underwear, etc.

Stratford is a well paved and lighted city having six public schools, a provincial normal school, a collegiate institute, a library, a business college and five parks.

The city owns the light and water systems. The 1921 population was 16,094.

Strathcona and Mount Royal, Sir Donald Alexander Smith, Lord (1820-1914), a Canadian statesman. He was born in Archieston, Scotland, and in 1838 he entered the employ of the Hudson Bay Company in Canada, where he spent several years on the Labrador coast and in the Northwest. He was elected to the Manitoba legislature in 1870, to the Canadian House of Commons, and afterwards became a member of the Northwest Territorial Council. He became High Commissioner of Canada in London in 1896. In the same year he was made peer with the title Baron Strathcona and Mount Royal. He was made chancellor of Aberdeen University in 1903. In 1896 he showed his interest in higher education of women by endowing Royal Victoria College in Montreal. To him is due to a large extent the development of Canadian railways and the completion of the Canadian Pacific Railroad. His wealth has been generously distributed for philanthropic purposes.

Strauss, Johann, the name of two celebrated Austrian composers, father and son. Johann Strauss the elder (1804-1849) was violinist and assistant conductor in Lanner's orchestra. Later he organized an orchestra of his own with which he made a number of tours. He composed many waltzes, raising the standard of dance music to a high artistic level. Johann Strauss, the son (1825-1899), composed more than 400 waltzes and several successful operettas. His waltzes are well and widely known. *The Beautiful Blue Danube* is the most famous among them.

Strawberry, a trailing herb of the rose family. It is stemless. White flowers grow on scapes a few inches high, and are succeeded a few weeks later by red fruit. Properly speaking, the strawberry is not a berry. In a berry, as, for instance, a currant or gooseberry, the seeds are surrounded by pulp inclosed in a skin. The seeds of the strawberry, on the contrary, are naked and dry on the outside of a fleshy receptacle. The acid of the strawberry is the same chemically as the acid of an apple. Strawberry plants may be raised from the seed, but the strawberry is propagated usually by means of jointed runners. A new plant is formed at each joint and takes root for itself.

There are about six species of wild strawberries. The wood strawberry has small, perfect fruit with a narrow neck. The seeds project slightly. This strawberry, known to the botanist as *Fragaria vesca,* is widely distributed through North America and Europe. The wild wood strawberry has the finest flavor of all strawberries. It is of this species that Dr. Boteler, as quoted by Izaak Walton, said, "Doubtless God could have made a better berry, but doubtless God never did." The Virginian strawberry is the strawberry of old fields throughout eastern North America. It is larger than the wood berry. The seeds are sunk in small pits. Other species are found in the West.

The garden berries of America and Europe are derived from a wild species native to the Pacific coast of America from Alaska to Chile. This Chilian species was introduced into Europe about 200 years ago. The American varieties came by way of England. In 1835 the Hovey Seedling, and a few years later the Early Scarlet, the first famous berries of America, were propagated. The successful raising of berries in America began with these varieties. A later favorite was the Wilson.

Strawberry vines, so-called from the runners, adapt themselves to a great variety of soil. They require moisture and fairly cool weather. The strawberry may be raised successfully in every state and province in North America. The flowers of some varieties have both stamens and pistils. Other excellent varieties have pistillate flowers only. Such varieties develop fruit only when planted with varieties that have stamens. Unless a large number of the little seeds be fertilized by pollen the berry produced is a mere "nubbin." A frost has the same effect. Gardeners find that by cutting off the runners as fast as they appear the yield of berries may be increased. Southern gardeners mulch their strawberries with pine needles. In the grain-raising states straw is used for the purpose. Mulch serves to keep the ground moist and to keep the berries clean.

The raising of strawberries has grown

into immense proportions. A recent authority states that the annual crop for the United States is 7,830,000 24-quart crates. This estimate should be increased from year to year. In the United States the strawberry season begins in February. The Florida and Texas strawberries are on the market in this month. A month later strawberries are ripe throughout a strip of 150 miles farther north. The basis of supply sweeps north over Vermont and Minnesota late in June. Manitoba berries ripen as late as July.

Streator, Ill., is an industrial city situated on the Vermillion River and on the Chicago & Alton, Wabash, Atchison, Topeka & Santa Fe, New York Central and Chicago, Burlington & Quincy railroads, 90 miles southwest of Chicago. From the city's numerous industrial establishments issue plate glass, bottles, carpet sweepers, sewer pipe, tile and bricks, automobile accessories, foundry and machine shop products and metal specialties.

Streator has a system of modern public schools, and a large park. The municipal buildings, and the nearby Deer Park and Starved Rock, are attractive features. In 1920 the population was 14,779.

Street Railway, a railway constructed upon the surface of the public streets of a city or town; called in England a tramway, which was the original name for a railway. The cars on such railways are propelled by various means, and the railways are often designated according to the nature of the power employed, as horse railways, cable railways, electric railways, etc. Most of the street railways in the United States are now operated by electric power, usually obtained from a power station through overhead wires and a trolley, or through conductors in a conduit. Some are operated by cables, drawn along the route by steam power in a central station, and some are still animal-drawn.

As early as 1832 a street railway was operated by horses in New York, and this was the only horse-car line in that city until 1852, when several charters were granted for similar street railways on the avenues running north and south in Manhattan Island. The first street tramway in England was opened in 1860, in Birkenhead, followed in the next few years by tramways in Liverpool, London, Glasgow, Edinburgh and Dublin. The first horse tramway in France was built from Paris to St. Cloud in 1856, and was called the American Railway, but it was not until 1875 that the city of Paris itself possessed a horse-car line. In South America street railways began to be built about 1866. The development of street railways is therefore of comparatively modern origin, gaining its chief impetus with the use of electric power for propulsion of the cars; although as lately as 1916 there were still horse drawn street cars in New York. Cable cars are still in operation where street grades are so steep as to render operation by electricity more expensive than the use of cables.

In a cable railway, the cars are moved by an endless cable traveling in a small tunnel under the roadway, and kept in motion by a stationary engine. Motion is communicated to the cars by means of a grip extended through a longitudinal slot in the covering of the tunnel, and so arranged as to be under the control of the driver or gripman. The cable is guided by suitable pulleys. The grip projects downward from the bottom of the car, and is provided at its lower end with jaws which can be operated from the platform of the car so as to grasp or unloose the cable at the will of the operator.

Probably over 99 per cent of the street railways of the United States are now operated by electricity, and this country leads the world in this form of transportation. At the date of a recent official report there were 1,307 electric railway systems, employing a total of 294,826 men and representing an investment of over five billion dollars. So complete is the network of electric railways, including interurban systems, that one can travel from Boston to Chicago by such roads, with only a few miles of steam travel where there are gaps yet to be filled.

The number of miles of single track operated by the electric railways was 44,676. The number of passenger cars operated was 79,914 and the number of revenue passengers carried in a single year was over 12 billion, and the gross receipts exceeded $700,000,000.

This enormous business has been developed since the year 1888, when the first electric motors propelling street cars in Richmond, Va., startled the people by the terrifying flashes at the overhead "collector" and from the motor brushes. Improvements were rapidly made in the various elements, and the electric motors soon displaced horses as motive power and led to the extension of the field of city transportation. Then there followed the development of interurban electric lines, operated like street railways, which have brought the outlying farms close to the cities in almost every locality east of the Mississippi River, and in the Northwest.

The electric equipment for city street-car service may be divided into two classes, namely, two and four-motor equipment. Of street-car trucks, in general, there are three types, including single trucks, maximum-traction trucks, and double trucks. The number of combinations that can be made by the electrical engineer when applying power to the car with these elements is surprising. The proportion of the total car weight on the driving-wheels largely determines the schedule possibilities and the grade-climbing capacity of a street-car.

With the single-truck, two-motor equipment, all the weight is on the driving wheels; so that this combination would be ideal were it not for the fact that the demands of seating capacity and riding quality put limitations on the single-truck car that usually make it necessary to have double-truck equipments.

With the double-truck car, there are many complications which arise when selecting a distribution of power for the driving axles. A selection which will give uniform weights on the wheel treads will, of course, give the ideal car, for it will reduce wheel slippage to a minimum under all conditions. With a four-motor equipment and motors "inside-hung" it is possible to secure the nearest approach to equalization of the weights on the wheel treads.

In addition to the many combinations of motor mounting for a single car, there is trailer operation to be considered, and also the effect of these trailers on wheel slippage, both on level track and on grades. An analysis of the weight distribution on single-motor cars indicates clearly the reason for usually selecting four-motor equipments when trailer operation is to be considered. This analysis of weight distribution shows why, when the grades to be negotiated are more than 5 per cent, or 5 feet in 100, it is the general practice to use four-motor equipments for double-track cars. There are at least twelve to fifteen different combinations of mounting motors on the different types of trucks in general use for street railways.

After the question of deciding how many motors are to be used on a street-car, the next factors to consider are how to get the greatest amount of work out of the motors per pound of weight, how to secure the motor that will use the least amount of power, and how at the same time to obtain an equipment at a price that will be justified by the results of these savings.

Car wheels in street-railway service have been for the most part of 33-inch diameter, but during the last few years there has been an increasing amount of interest exhibited regarding 24-inch wheel equipments for city service. Motors that are particularly efficient and well constructed have been designed for use with these equipments. Due to the decreased weight of the wheels and trucks, as well as to the reduction in the weight of the motors, this subject has been carefully studied by electrical engineers.

In addition to the weight savings in street-car equipment, there has also been an innovation in control, which consists of a change in the standard motor circuit connections, so that three running speeds are obtained. With this combination of control there is a considerable saving in power consumption; in some cases as much as 7 or 8 per cent. With this control, however, experience has shown that the heating is not equally divided among the four motors of the equipment. Improvements that are constantly being made in all manner of electrical apparatus will doubtless obviate any difficulty from this source.

MONORAIL. The monorail is a device for operating a car suspended from a single rail which is supported on a steel frame. The car is usually from twenty to twenty-five feet above the ground, and the motive

power may be steam or electricity. Monorail systems have been tried in Germany, England and some other European countries, but they have not proved financially successful. In the United States short lines are found in some amusement parks but, owing to the expense of installing the system, they have not been used as a means of public transportation. See RAILROAD; ELECTRIFICATION.

Strickland, Agnes (1806-1874), an English writer. She was born in Suffolk. The list of her writings contains many titles. She is known best as the author of a very remarkable series of *Lives of the Queens of England* in twelve volumes and *Lives of the Queens of Scotland* in eight volumes. Progress in writing history is so rapid that one feels in reading her *Lives* that they are already somewhat out of date.

Strickland, Hugh Edwin (1811-53), an English geologist. After studying at Oxford he succeeded Dr. Buckland as reader in geology there. He was one of the founders of the Geological Society and of the Ray Society. As a result of his influence, the last named society published Agassiz's *Bibliographia Zoologiae et Geologiae*. Strickland was associated with Murchison in the study of the Silurian system.

Strike, in social reform, a cessation of work by wage earners pending the settlement of dispute between themselves and their employer. The most common form is a strike for higher wages. A strike designed to help other strikers win is called a sympathetic strike. In case the employes of an establishment refuse to work unless the management complies with some demand, the refusal is called a strike. In case the management refuses to allow the employes to work unless they comply with some condition dictated by the management, the refusal is called a lockout. In a strike the employes take the initiative; in a lockout the demand is made by the management. The strike is not new. Writers claim that strikes were not unknown among the workmen who labored on the Parthenon and on Solomon's Temple. It is of record that the workmen of Sparta and Athens and of Rome were organized, and that revolts occurred. The question is whether they were not of the nature of uprisings against the authority of masters, rather than a strike by freemen for higher wages or shorter hours. Several revolts are chronicled, including an outbreak of 20,000 Greek slaves at Sunium 413 B. C. and the more noted revolt of Spartacus at Capua 73 B. C.

The journeymen of the medieval craft-guilds formed associations and declared strikes. In 1303 the cordwainers (leather-workers) of London were forbidden to assemble and conspire against their masters. In 1329 the journeymen girdlemakers of Breslau went on a strike. Something of the sort took place among the French tanners in 1349. In 1538 we come to the real thing:

> The Bishop of Ely reports to Cromwell that twenty-one journeymen shoemakers of Wisbech have assembled on a hill without the town and sent three of their number to summon all the master shoemakers to meet them, in order to insist upon an advance in their wages, threatening that "there shall none come into the town to serve for that wages within a twelfth-month and a day, but we woll have an harme or a legge of hym, except they woll take an othe, as we have doon."

The earliest strike in the United States is thought to have been that of the New York City bakers in 1741. The shoemakers of Philadelphia struck repeatedly 1796 - 99. The terms "strike" and "scab" and "turn-out" were in common use as early as 1835—the scab being then as now one who took the place of a striker. Between the strike of the bakers in 1741 and 1881, 140 years, there were, according to the reports of the United States Labor Bureau, 1,491 strikes. Over half of this number took place in the year 1880. Some 1,089 were for higher wages and 316 succeeded. Between 1881 and 1900, 14,457 American strikes were ordered by labor organizations, and 8,326 strikes were declared by workmen not acting under orders. Fifty-three per cent of the union strikes succeeded; thirty-five per cent of the non-union strikes won.

From 1916 to 1920, inclusive, there were over 17,599 strikes in the United States.

1916	3,681
1917	4,324
1918	3,248
1919	3,444
1920	3,109

The total number of persons involved in strikes and lockouts in 1920 was 4,112,507. The strikes involving the largest number were that of the bituminous coal-miners, 435,000; the steel strike, 367,000; the strike of the railroad shop workers, 250,000. Wages and hours of labor are the chief causes of strikes; occasionally the question of the closed shop is involved. In the building trades, the question of jurisdiction among unions has caused a number of strikes.

The right of labor to strike is unquestionable. The work of their hands is the only thing workingmen have to sell. They have a perfect right to put a price on it and to refuse to work if they do not get their price. Workers are justified in demanding reasonable hours and sanitary conditions, otherwise laborers would be slaves. On the other hand, the cause of strikes is prejudiced too often by accompanying acts of violence. A farmer who fails to sell a load of apples to a merchant is not justified in breaking the merchant's windows. A harvest hand who is turned from the gate because he asks higher wages than the farmer is willing to pay is not justified in wrenching the gate from its hinges. The case is not altered when a thousand men *offer their services and are refused*. It is difficult for men on the street with empty dinner pails and hungry children at home to out-wait and outargue the well fed occupant of a comfortable office; it is true that strikes would be settled more quickly if the employer were dependent on labor for daily bread; but for all that, nothing delays the day of justice like carousing and violence to persons and destruction of property. Labor leaders like John Burns, Samuel Gompers, and Terence Powderly understand this full well.

Strindberg, (Johan) August (1849-1912), a great Swedish author, was born at Stockholm. He was a graduate of the University of Upsala. His poverty and his temperament made this a period of difficulty, for he was in constant trouble with the professors there. Upon leaving the University he secured an appointment in the Royal Library, Stockholm. Here he lived a rather Bohemian life, and busied himself with tutoring, acting and writing reviews for several journals. In 1879 his realistic *Red Room* appeared, which startled orthodox Sweden, for it was a biting satire on the artistic and literary circles of Stockholm. He was an insatiable student and became one of the most learned men of the North. However, he had a leaning towards drama, and his first historical play was *Master Olof,* written in 1872. From 1883 to 1897 he lived in Switzerland, France, Italy and Denmark, but finally settled down in Stockholm. He studied so much and made so many researches that for some time he suffered a mental breakdown. He was versed in alchemy, chemistry, biology, philosophy, and, indeed, his writings show him to have been a master of almost every subject he chose to become interested in. His character was most complex and peculiar, as his books indicate.

Among his historical dramas are *Gustavus Vasa, Eric XIV, Gustavus Adolphus* and *Charles XII.* Other dramas are *Crimes and Crimes, Christmas, Easter, The Father,* and *Miss Julia.* Among his novels are *The Bondwoman's Son, A Fool's Confession, Alone, Marriage* and *The Natives of Hemso.* Strindberg also wrote a large number of sketches and essays on a variety of interesting subjects. See LITERATURE, SWEDISH.

Stromboli, strŏm′bō-lē, a noted volcano. It rises from the bottom of the Mediterranean, north of Sicily. It is a conical pile of cinders and slag, such as are produced by an iron furnace. It rises to a height of 6,000 feet, half of that height being above the level of the sea. It is four or five miles in diameter at the sea level. The chief crater is situated about 1,000 feet below the peak. Stromboli is always in action. The steam rising from its crater looks like smoke from a chimney. At night it presents a magnificent appearance. The white hot lava within the crater sends out a column of light, giving the appearance of an immense conflagration. At times the lava bubbles up or explodes, throwing streams of lava dust into the air. The lower portions of the mountain are fertile and are inhabited. Cotton, grapes, and figs are the chief productions. Pumice and sulphur are exported. See VOLCANO.

Strontium, a metal closely allied to barium. It was first noticed in combination with carbon in the lead mines of Strontian in Argyllshire, Scotland, whence the name. It was separated from other elements by Davy in 1808. Strontium is a yellowish metal. It is malleable and ductile. It burns with a brilliant crimson flame in heated air, and for that reason strontium is employed widely in the preparation of fireworks. Strontium carbonate is used in the refinement of sugar.

Strychnine, a vegetable poison from Java. It is a colorless, prismatic, crystalline substance extracted from the nux-vomica and the seeds of other plants of the same genus. These strychnine-producing plants are peculiar to the East Indies, particularly Java. Strychnine is without odor, but it is intensely bitter. One part of strychnine may be detected in 20,000 parts of water merely by the bitter taste imparted. Strychnine is an alkaloid—an energetic poison. A grain is a fatal dose for a man. Wheat, oats, or corn, steeped in water containing a little strychnine, may be dropped about their holes and runways to rid a farm of rats, gophers, or prairie dogs. If meal be stirred in after the grain has been soaked, the bitter taste is obscured, and the bait is more likely to be taken. Strychnine is the poison most often used for coyotes also. See POISON.

Stuart, a royal family of Scotland and England. Walter, said to have been a young member of a Norman family that came over to England with William the Conqueror, entered the service of David I of Scotland and received large estates and the office of steward of Scotland. Walter died in 1117. The office of steward became hereditary in his family. Father and son for seven generations were stewards. The title was adopted as the family name. Later the spelling was changed to Stuart to give it a French appearance. The fifth Steward was one of six regents. The sixth Steward married Marjorie, the daughter of Robert Bruce. Robert, a son of this marriage, was also a regent, and in 1371, on the death of his uncle, became king Robert II of Scotland. Successive Stuart rulers of Scotland, beginning with this Robert II, were Robert III, James I, II, III, IV, V, Mary Stuart, Queen of Scots, and James VI, who became James I of England. The line continued through Charles I, Charles II, James II, Mary, and Anne. A son of James II, James Edward, and a grandson, Charles Edward, who resided abroad in France and at Rome, made efforts to recover the throne and are known as the Old Pretender and the Young Pretender respectively. Henry, a brother of the Young Pretender, became a cardinal in the Catholic church. After Charles Edward's death the cardinal assumed the title of Henry IX of England and Scotland. In his old age and pitiful poverty, a pension of $20,000 was settled on him by George III. He died in 1807, the last male descendent of the once powerful Stuart family. Through a female member of the family, the Stuarts are still represented among ruling families by the House of Savoy, now the reigning family in Italy.

Stuart, Gilbert (1755-1828), an American portrait painter. He was born at Narragansett, Rhode Island. At the age of thirteen he began painting portraits without instruction. In 1770 a friend took him to England, but dying, left Stuart to return to America in poverty. He managed to scrape together some money by painting portraits and went again to England where he remained during the Revolutionary War. None the less he retained his American patriotism. In 1792 he returned to America with the avowed purpose of linking his name with that of the Father of his Country by painting the portrait of Washington. He established his studio in New York, Philadelphia, Washington, and Boston successively. He painted portraits of the first five presidents, and of Edward Everett, John Jay, Jacob Astor, Judge Story, W. E. Channing, the Quincys, and Admiral Perry. While in England he portrayed George III, George IV, and other members of the royal family, as well as Mrs. Siddons, Sir Joshua Reynolds, and Benjamin West. His most noted portrait, that of Washington, is owned by the Boston Athenaeum.

Stuart, James Ewell Brown (1833-1864), an American general, born in Patrick County, Virginia. After his graduation from the United States Military Academy he went west and spent several years in

Texas and Kansas as rifleman against the Apaches. In the Civil War he was a cavalry officer and took part in the battles of Bull Run, Fredericksburg, and Antietam. He was made brigadier-general in 1861 and major-general in 1862. When "Stonewall" Jackson was disabled Stuart assumed temporary command of Jackson's corps. He assisted Lee in the battle of the Wilderness, and when Sheridan attempted his dash into Richmond, Stuart came to the rescue of the southern capital, but was mortally wounded at Yellow Tavern.

Stubbs, William (1825-1911), a noted British historian. He was graduated at Oxford in 1848. Much of his subsequent life is connected in one capacity or another with the University of Oxford. Stubbs was an untiring student of the early history of England. He dug into the records of Canterbury and into the chronicles of the reigns of the earlier kings. He published numerous works. His reputation rested chiefly on *The Constitutional History of England in Its Origin and Development*. Another important piece of work was an edition of *Select Charters and Other Illustrations of English Constitutional History*. To American students Stubbs is the historian of the English constitution.

Stucco, stŭk′kō, a building material. It is composed of lime and white marble crushed into a powder. It is a lime plaster in which sand has been replaced by pulverized marble. It is a beautiful white plastering material suitable for inside work. It takes a smooth, satiny finish and looks like marble. It may be molded into flowers, arabesques, moldings, cornices, and the like. It can be molded more easily than marble may be carved. Though far more substantial and more beautiful than ordinary plaster, it is considered a sham in comparison with cut marble. Stucco was a favorite material with Moorish, that is to say, Arab architects. The interior decoration of the Alhambra is done in stucco. The pendant ceiling in Henry VIII's chapel in Westminster is of stucco. Some of the fine work in Florence and Rome is of stucco, but the Italians were partial to marble. Nearly all German work is in honest stone. See CEMENT; CONCRETE; SCULPTURE; PLASTER OF PARIS.

Sturgeon, stûr′jŭn, a family of fishes having elongated funnel-shaped bodies, with five rows of bony keeled shields or scales. The sturgeon is the largest fresh water fish known. The snout is protruding, formidable in appearance but harmless. The mouth is a sucker-like tube on the underside of the head, through which the sturgeon draws small, soft mollusks and plants. There are twenty species. Four are found in North America. The common sturgeon is a frequenter of our Atlantic coast rivers. It resembles the sturgeon of commerce found so abundantly in the Caspian and Black seas. It is from six to ten feet long. Caviar is pickled sturgeon roe. Isinglass is the dried bladder of the sturgeon. Wilmington, Delaware, is the center of the Atlantic sturgeon fishery. A fine, large sturgeon weighs 500 pounds and is worth $75. Caviar is worth a dollar a pound. The Booth Packing Company maintains a large fishery for sturgeons at Lake of the Woods. These sturgeons reach a length of six feet. A Pacific coast sturgeon is one of the largest food fishes. It attains "a length of thirteen feet and a weight of 1,000 pounds." A specimen taken in the Snake River of Idaho measured eleven feet in length and weighed 650 pounds. The so-called shovel-nosed sturgeon of the Mississippi Valley is not a sturgeon. It is without the armor of the sturgeon. Its head is prolonged into a thin, paddle-shaped bone one-third the length of the body. The name paddle-fish has been suggested. See FISH; CASPIAN; CAVIAR; ISINGLASS.

Sturleson, Snorre. See SNORRE.

Sturm, John (1507-1589), a German educator. He was born at Schleiden, Prussia, and received his degree at the University of Paris. Sturm was for forty years director of the gymnasium at Strasburg. He organized his students into twelve classes or grades—a plan subsequently followed by the best schools of Europe. The gradation of students in the American high school and academy may be traced to Sturm. In church matters Sturm was a follower of Martin Luther.

Stuttgart, stŭt′gärt, the capital city of Würtemberg, Germany. It is situated in a small plain, surrounded by wooded

heights. Vineyards, orchards, and suburban residences give the hills a delightful aspect. The city became a place of royal residence in the fifteenth century. The official buildings are grouped about Palace Square. They are surrounded by well kept parks adorned with fountains, monuments, and statuary. There are numerous palaces, churches, and museums. Stuttgart is noted for an important art gallery and for public collections of antiquities, coins, and natural history, a conservatory of music, theaters, and hotels. The city is one of the most important publishing centers in Germany. The Royal Library contains half a million volumes, including 7,300 Bibles, the greatest collection of the kind in existence. The atmosphere is one of art, music, and leisure, rendering the city a favorite place of residence for English and American tourists. Stuttgart had a population in 1919 of 309,197. It is a commercial city of importance and has manufactories of chocolate, pianos, paints, chemicals, laces, cloth, leather, and furniture. There are mineral springs in the vicinity.

Stuyvesant, stī′ve-sant, **Peter** (1602-1682), a Dutch governor of the New Netherlands. He was a soldier by profession. He lost one leg in an attack on a Portuguese island in the West Indies. In 1644 he was sent by the Dutch government to New Amsterdam, now New York, to succeed William Kieft, under whose management affairs had fallen into disorder. This one-legged governor stumped about with energy and made short work of disturbers. He punished the troublesome Indians and arranged a boundary between New Netherlands and Connecticut. In 1655, with an army of 700 men, he sailed up the Delaware and subdued the Swedes who had settled there. Malcontents at home soon found that the sturdy old soldier was their master. Nearly ten years of quiet and prosperity followed. In 1664 an English fleet appeared in the harbor, and Stuyvesant was obliged to surrender to the English, who changed the name of the town and province to New York. The old governor went to Holland, but soon returned to live under the flag of England. He ended his days on his farm, now a part of New York City. He gave his place a Dutch name, which has survived in the Bowery, a street near Castle Garden. Stuyvesant was buried in the old church of St. Mark's. He is the chief character in Irving's half comic, half earnest *Knickerbocker's History of New York.*

Stylites, Simon. See ANCHORITES.

Styx, stĭks, in Greek mythology, one of the five rivers of Hades. It flowed seven times around the infernal regions. According to Hesiod, Styx was the name of a nymph, daughter of Oceanus and Tethyz. When Zeus called upon the gods for aid in his war with the Titans, Styx was the first to respond, bringing her children, Power, Force, Emulation, and Victory, with her. As a reward her children were allowed to remain with Zeus in Olympus, and Styx was given a home in a grotto supported by silver columns. This grotto was situated near the entrance to the infernal regions, and the nymph presided over the infernal river which bore her name. Moreover, Zeus decreed that the gods should swear their most solemn oaths by the name of Styx. When this oath was taken, Iris brought water from the river, which was poured out while the oath was uttered. If such an oath was broken, the god who thus foreswore himself was deprived of speech and breath for a year, and debarred from the council of the gods for nine years. According to one account, Thetis, the mother of Achilles, dipped her infant son in the river of Styx, making every part of him invulnerable excepting the heel by which she held him. The word Styx means hate. Milton describes the river as "Abhorred Styx, the flood of deadly hate." John Kendrick Bangs has written a bright skit, called *The Houseboat on the Styx,* in which the conversation of Noah, Shakespeare, and other celebrities is described most facetiously.

Submarine, a boat that can travel under water, designed especially to destroy ships in time of war. The submarine is a steel shell resembling a huge cigar. The steel plates forming the shell are riveted to a strong frame—and a number of compartments which can be filled with water are in the bottom of the boat. A conning tower rises from the center to the height of four or five feet. It is provided with windows of thick glass and serves as the captain's

bridge when the ship is afloat. A steering rudder is attached to the stern and diving rudders are attached to each side near the bow and stern. These rudders can be inclined upward and downward and direct the boat in submerging and rising.

The periscope, placed in front of the conning tower and known as the "eye of the ship," is a tube containing lenses and mirrors so arranged as to give the captain a view of the surface of the surrounding water. The periscope tube can be extended to a length of twenty feet, and can be rotated so as to give a view in any direction. The image is reflected upon a table and viewed through a glass resembling a field glass. The view enables the commander to judge accurately of the location and distance of objects shown. Each submarine has two periscopes—one for the commander and one for the helmsman.

Electric motors supply the power for propelling the boat when it is submerged and a gyro-compass shows the direction in which the boat is moving. The torpedo tubes, which are practically guns from which the torpedoes are fired, are usually located in the upper part of the bow. Small submarines carry two torpedo tubes and large ones more. The keel is filled with lead, of which each boat carries a weight of from five to twenty tons. In case of accident this weight can be detached, its release allowing the boat to rise to the surface at once. Each submarine carries a number of tanks containing compressed air, which is used to supply the air for the men and for forcing water out of the compartments to allow the boat to rise to the surface.

Submarines are of two classes—coastal submarines, designed for coastal defense, and fleet submarines designed for longer voyages. Coastal submarines are from 150 to 200 feet in length and when submerged they displace 250 to 600 tons of water. Fleet submarines range from 200 to 400 feet and displace from 800 to 1,200 tons of water. The speed of a submarine at the surface is from fifteen to twenty-two miles an hour; when submerged it is from nine to eighteen miles.

When the submarine is ready to submerge the opening in the top of the conning tower through which the men enter the boat is closed by a watertight lid, which is screwed in place. The water tanks are filled and the boat slowly settles. The driving rudders direct the boat downward until it reaches the desired depth when they are turned to a horizontal position. By tilting these rudders upward the boat can be raised to just below the surface.

THE WORLD WAR. Previously to the World War the submarine had received but little attention, but from 1915 to the signing of the armistice it was the scourge of the seas and the terror of every mariner. Germany brought this instrument of destruction to such a degree of perfection that for a time there was a feeling that German submarines would drive the shipping of hostile nations from the seas. During the war the tonnage of allied and neutral merchant ships destroyed by German submarines was 8,451,000.

However the war proved that the submarine was not invincible. A new type of boat, the submarine destroyer, was constructed, and as soon as Great Britain and the United States were able to place great fleets of destroyers on the sea, the destruction of ships by submarines was checked, and during the last months of the war but few German submarines left their harbors.

HISTORY. The boat from which the modern submarine was developed was invented by an Irish-American, John P. Holland (see HOLLAND, JOHN P.), who built his first model in 1877. Several attempts to construct a submarine boat had previously been made, one by Robert Fulton in 1800, but none was successful. During the Civil War the Confederates used a submarine propelled by steam engines and were successful in destroying a few ships, but interest in this type of warship lapsed until Holland's invention appeared and was adopted by the United States navy. The government, however, was slow in creating a fleet of submarines and at the outbreak of the World War the American navy was far behind the British and German navies in submarines. See TORPEDO.

Submarine Mine. See MINE, SUBMARINE.

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